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MODEL AIRPLANE NEWS

THE WORLD'S PREMIER R/C MODELING MAGAZINE Canada $3.75

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Top Flite's KITTIWAKE

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VOLUME 116, NUMBER 1 JANUARY 1988

MODEL AIRPLANE NEWS

ON THE COVER: Background, a replica Waco YMF-5. Top inset, Nick Ziroli warms up his Indy Eagle for next month's ARF issue. Bottom inset, Top Flite's new Kittiwake on the step. Waco and Eagle photos by Rich Uravitch; Kittiwake photo by John Sullivan.

FEATURES

CONSTRUCTION

COLUMNS

DEPARTMENTS

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Editorial

by RICH URAVITCH

I'VE RECENTLY been looking very closely at all of the modeling publications including most of the foreign periodicals. This provides me the opportunity to stay abreast of what's going on worldwide in the modeling fraternity while offering numerous insights into what readers in general are looking for in the way of information. Some interesting observations emerged from this exercise, a number of which were confirmed by communications with you, our readers. Frequently mentioned are our product reviews, or Field and Benches. Most of the comments are positive, complimenting the color, layout and substance of the editorial matter. Others, however, challenge the objectivity of the review, or occasionally the veracity of the reviewer. To broaden the scope of these reviews we're going to try something new, which, hopefully, will give you direct input by providing the opportunity for making *your* views known. Our Field and Benches represent one man's opinion which we believe to be accurate, but still can only represent a "cross section" of one.

Here's where *you* come in. We will occasionally present a list of product reviews which we have either under way or scheduled. If you are presently working with that same product, or will be, we invite you to take a few black and white pictures and write a few paragraphs telling us what you thought of the product. If schedules permit, we would like to present that input as a supplement to the full-blown Field and Bench. In return for use of your evaluation, we'll award you a new subscription or renew your existing one. Maybe we'll even put you on board for a future Field and Bench. Not a bad deal for something that you were building anyway! We'll hopefully receive and be able to use a number of such supplements to each Field and Bench, and they will be selected based on their value in presenting additional opinions of the product being reviewed. More objective than that, we can't get!! Here are some kit reviews presently in work:

Great Planes ElectriCub
Byron Originals BD-5J
Hobby Shack EZ Zero
Coverite Peashooter
Bob Parkinson Regal Eagle
GM Plastics Corsair
Hobby Shack Loadstar
Sig Citabria
Goldberg Super Chipmunk
Midwest Aerostar 20
Byron Originals Bullet
Ace 120-4 Bipe
Royal PDQ Cherokee 20

Let's hear from you guys!!

From all of us here at *MAN*, may your holidays be happy and your new year even better. ■

Airwaves

Seeking Coverage

This is my second year as a subscriber to your magazine, and I must compliment you on the overall quality of the publication. I have just read the September issue for the second time, and I'm excited about the prospect of fitting one of my planes with floats. In spite of this enthusiasm, however, I do have a question that I need answered before I can proceed safely. To my knowledge, AMA insurance protection, required at all sights in my area, only covers an individual when flying at a sanctioned field. If this is true, float flying at any convenient lake or pond would be a great risk. What are my options?

GERARD TONNO
Copiague, NY

Gerard's question is an excellent one. It prompted us to query the AMA legal folks, as their response would be of major importance to modelers all over the country. Given the current "litigation-happy" climate in which we live, with its usually inflated and largely unjustified settlements, the AMA member should be aware of where their insurance policy coverage actually provides protection.

Carl Meroney, AMA Director of Special Services, informed us that the AMA doesn't sanction fields, but clubs. Obviously, if the club has a field, the activities at that field are covered. More specifically, on the seaplane issue, individual modelers can fly anywhere, including any body of water, as long as operations are in accordance with the AMA Safety Code and providing common sense is employed. Carl also indicated that the AMA was more concerned with how *you fly rather than* what *you fly."*

We appreciate the AMA providing the direction, so fly safe and let's be careful out there! RU

Help For Beginners

I would like to thank you for an excellent magazine. I am fairly new to the hobby and have fouund much valuable information in the columns "Basics of R/C" and "Small Steps." I have recently built Randy's "Hawkshaw" design from your plans. I would like to suggest that you take up the subject of suitable scale projects for the beginner, and perhaps run a series on how to create your own plans from scale documentation.

MATS RAMNEFORS
Sweden

Thank you, Mats, for taking the time to write. It just so happens that we are preparing material on a number of ways to develop your own "scratch builders" drawings. Stay with us. RU

Che Magnifico!

I write from Italy to say how much I appreciate your magazine, of which I have been a subscriber for a long time. I enclose two pictures of my last scratch-built model, and I find the workwood most interesting. The drawing is mine. The model spans 18 feet, weighs 55 pounds and is powered by a 5 HP engine. Thank you very much.

DAVIDE CRISTIN
Gorizia, Italy

It is an absolute pleasure to see projects such as yours, and we thank you for the opportunity to share it with our readers. We'd guess that it took a tremendous amount of time, considering all the built-up ribs. Let us know when it is finished and flown. ARF builders... eat your hearts out! RU

Military Propaganda?

After reading *Model Airplane News* for the past four years, I must take issue with an article in your August 1987 magazine. Budd Davisson's comments on the McDonnell-Douglas F-15 neither impressed nor interested me. I find aircraft fascinating, but these hideous machines symbolize unnecessary suffering, death and destruction. Reviewing these multi-million-dollar toys of war is blatant military propaganda and has no place in any hobby magazine. In a model publication of such high caliber, I find your affliction with war aircraft rather disturbing.

ANTHONY FEATHERSTONE
Ontario, Canada

As the saying goes, "You can't please all of the people all of the time." Your position, however, struck a nerve with me personally and I'll respond to your comments.

The name of our "high-caliber" publication is Model Airplane News, *not "hobby" news. As such, we try to present our loyal (and I might add, growing) readership with a cross-section of airplane material, of which military subjects are an integral, if not major, part.*

We, too, find aircraft fascinating, and that fascination is not limited to airline subjects. Even the venerable Cub, "golden age" Wacos and Fairchild products of by-gone days saw service in the military. Are they also to be considered "toys of war?" No, Mr. Feathersone, I think not!

Where would our airplane heritage be were it not for the Spitfires, Mustangs, Messerschmitts and Thunderbolts, all of which are featured in this issue? I suppose a perception change could do it, though. These airplanes, although they may have fought the war, made their marks by preserving the peace. RU

We welcome your comments, opinions, and suggestions. Letters should be addressed to "Airwaves," Model Airplane News, 632 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and length.

Fifty Years Ago...

by STEVE POND

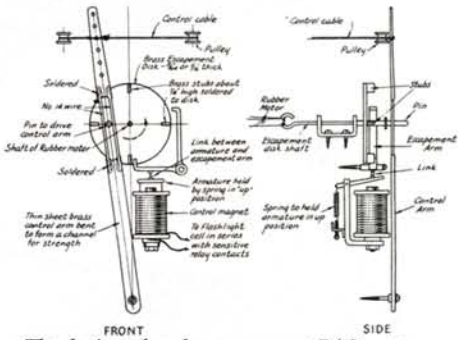
IN 1938, the eyes of the modeling world were focused on the development of the "radio-control" airplane. At that time there were a few attempts at controlling airplanes with radio devices, but they were generally too heavy and impractical to ensure successful flights. The radio systems during the experimental stages were comprised of automatic selector switches and electromagnets or electric motors and were a rather ample cargo for the plane to carry—not to mention the large complement of batteries needed to power them. The progress toward a simple and lightweight system was covered in the January '38 issue of *Model Airplane News* by Clinton B. De Soto. A group of individuals, appropriately named the American Radio Relay League, began a collaborative effort to construct a radio system that was not only lightweight, but reliable. The actuator in this system used a rubber band, similar to those used in the rubber-powered airplanes, to supply the power for the control operations.

This British "Piggy-Back" combination even pre-dated the Luftwaffe "Mistral" attempts. An effort to extend the range of the upper machine.

This radio system, generally referred to as "escapement," only allowed movement of the rudder; the modeler relied on thermals to provide elevation! This type of actuator was produced as late as the early '60s by Babcock and Citizenship. The receiver was still powered by a battery, but it was rather small in comparison to those required for an electric radio system. As crude as it was in comparison with current standards, this system was a stepping stone for all the more advanced radio systems that were to follow.

On the frontiers of full-scale aviation were the Boeing XB-15 bomber, The Percival Mew Gull, and Col. Roscoe Turner's new "Meteor." The Boeing XB-15 was the latest and the largest land-based bomber with a wingspan of 150 feet and four 1000-horsepower engines. Although The Percival Mew Gull was not a brand new design at that time, it was already starting to make a name for itself by winning the second straight King's cup Race in England at speeds of over 230 mph. Col. Roscoe Turner's new Meteor surprised the aviation world by winning the Cleveland Air Races at a speed of more than 300 mph. The "Meteor," or the Laird-turner 14 as is was later called, had a fuselage length of 23 feet 4 inches, wingspan of 25 feet, and a wing area of 95 square feet. Another item in the news was the Bristol Blenheim Bomber. The Blenheim was a three- to four-place ship that was capable of speed exceeding 275 mph.

Other features in the January '38 issue of *Model Airplane News* included an



The design of early escapement R/C systems remained virtually unchanged throughout its life span.

article by Robert C. Morrison on how to build a scale model of the then popular Percival Mew Gull. The drawings didn't reveal the skeletal structure of the aircraft, but they provided an excellent reference for the modeler who wished to make his "Gull" a scale machine. Another article in this issue was the "Secrets of Successful Indoor Prop Operation" by Carl Goldberg, the founder of Carl Goldberg Models. This gave the enthusiast of rubber-powered modeling some helpful tips on how to make a prop similar to the one that powered a plane to a record 23½-minute flight.

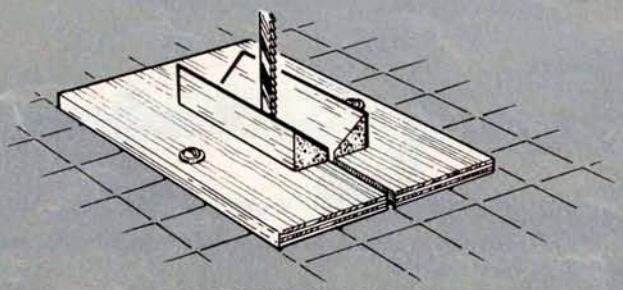
Nineteen thirty-eight was a banner year for the model aviation community with the concept of radio-control finally becoming a reality, and *Model Airplane News* was there, perpetuating, as it is now, a tradition of excellence!

The "new" Boeing XB-15, precursor to the B-17 flying fortress. 150-foot-span with 4,000hp!

Hints & Kinks

by JIM NEWMAN

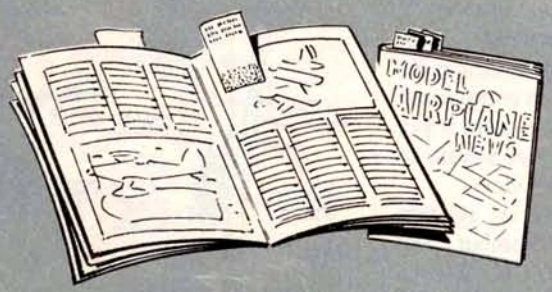
Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send rough sketch to Jim Newman, c/o **Model Airplane News**, 632 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO, AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.



DO-IT YOURSELF TRI STOCK

Triangle stock is approximately 25 percent more expensive than its near-equivalent square stock. You can cut your own triangles with this simple jig made from a ply base to which is glued two triangular balsa guide strips—in this instance 4 inches long. Note the slot to allow insertion of the saw blade and the two screws for attachment to your saw table. You could use thumb nuts to advantage.

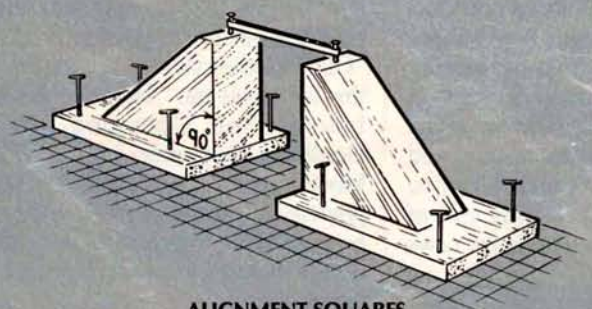
Dave Kovensky, Maryland Heights, MO



M.A.N. MARK

Many of us put strip paper book marks into our copies of M.A.N. and usually write the title of the subject of interest at the top. That's fine—until the book mark slips down inside the magazine to be lost forever! This modeler has a cure. He uses strips of 3M brand POST-IT note pad which has a band of very light tack adhesive at the bottom edge. Now his book marks do not submerge out of sight.

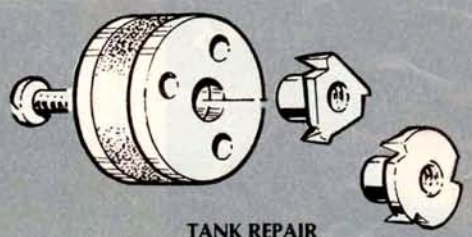
James Madsen, Fresno, CA



ALIGNMENT SQUARES

Use your table saw to accurately cut some ¾-inch thick pine triangles, tall enough to exceed the height of your usual size fuselage sides. Glue these blocks to ¼-inch balsa bases which allows these triangles to be conveniently pinned through to your building board, using large Tee pins. The rubber band across the top ensures that pressure will not allow the blocks to be forced out of vertical. Very useful tools indeed when squaring up that fuselage.

Charles Mann, Wilbraham, MA



TANK REPAIR

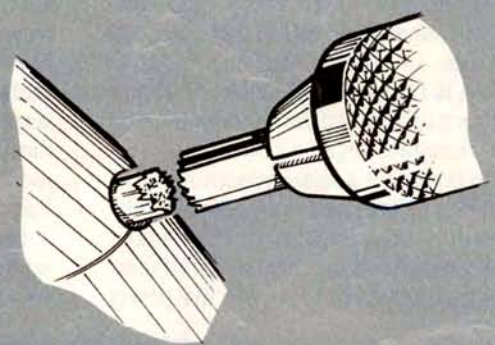
Ever strip the thread out of your tank stopper? You can easily make a repair that is more lasting than the original arrangement. Slice the protrusion from the rear of the nylon washer. File the sides off the appropriate size Tee nut (blind mounting nut) so that it will fit between the brass tubes. Now open out the center hole in the nylon washer and press the Tee nut into it as shown. The center screw now threads into the Tee nut instead.

John Rice, Los Angeles, CA

MINI BITS FOR DREMEL

If you possess one of those high-speed motorized hand tools such as the Dremel MOTO TOOL, you will know that collets are not made to accept ultra small drills in the #40 to #60 range, in spite of the fact that the tool operates at about the right speed for such sizes. Bind those drill shanks with fine copper wire to fit the collets snugly, adding a little sweat solder for permanence. Here is the secret formula: drill shank diameter plus twice the wire diameter should be a couple of thousandths less than the collet diameter.

George Neil, Huntington Station, NY



TUBULAR RAZOR

A broken leading edge dowel used to be a real "butcher job" to repair until this hint came along. Select a metal tube which will slide nicely over the broken stub of dowel. Sharpen or file some teeth around the end of the tube which can now be chucked into your drill. This new-found hollow drill very effectively cores out the broken stub, allowing a new dowel (perhaps next size larger) to be glued into the very neat hole.

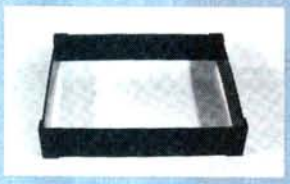
Richard Byrd, Ft. Worth, TX

SPACE CASE

Modular Transmitter Case K

Tailored Protection For Your Transmitter in an Easy to Assemble Form

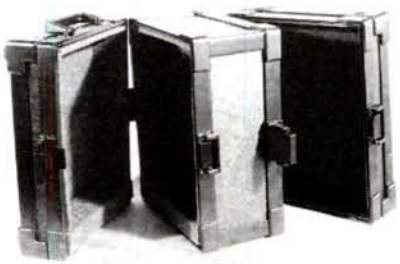
by PAUL TRADELIUS



From left: the four sides are held by corner posts; reinforceme added to top and bottom of sides; corners are then added to finish

ONE OF THE PROBLEMS all R/C flyers have— even if we don't realize it—is how to adequately protect the investment we have in our expensive radio gear. Most of us know to pack the receiver in foam and shock mount the servos to protect them from vibration, but what about that expensive transmitter we keep on either a shelf in our building room or on the car seat as we go to the field? Well, SpaceCase, distributed by Rotary Wing Concepts*, has come to the rescue in the protection of our transmitters with the introduction of their modular transmitter case kits. These kits are constructed of tough, fuel proof, ABS plastic, which is almost indestructible, and have a foam liner to custom fit your transmitter. Two case sizes are available and expander modules let you add as many transmitters to the original case as you desire. And should you need protection for your R/C helicopter or car, these special cases are also available.

Both the transmitter case kit and the expander kit come with all the materials you'll need to complete construction in about an hour. The glue provided is of the type that partially melts the two joining pieces of plastic to form a permanent bond, with initial drying taking thirty seconds and a permanent being formed overnight. Should y unfamiliar with working with this t glue, two sample pieces of plast provided for practice gluing. The th remember is not to use too much gl will not only get on your hands, bu on the case where you don't want



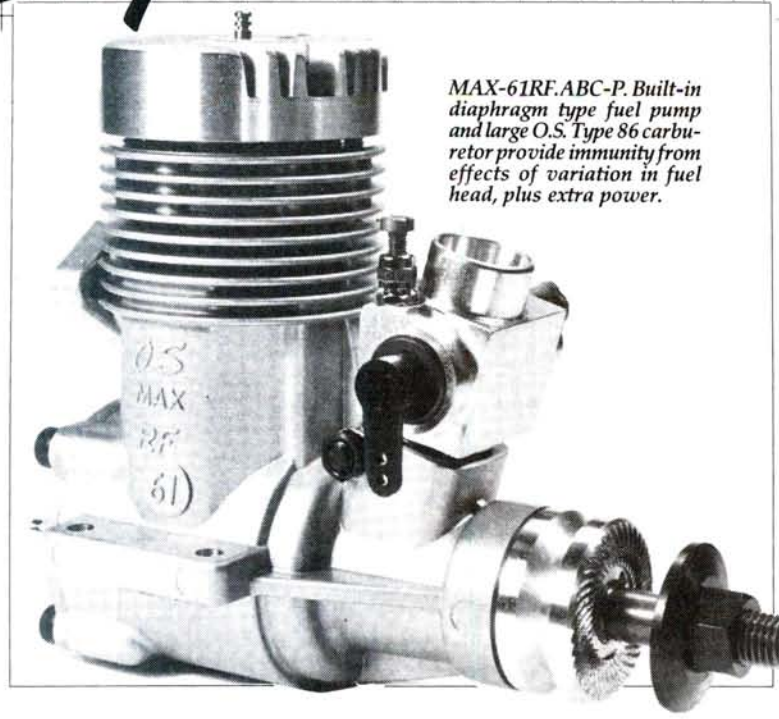
Space Case with expander module fitted in center.

Because the case is so easy to a ble, and a picture is worth a tho words, the following constructic quence will show what little w needed to have a top-notch case th give your transmitter many ye protection.

**The following is the address of the m turer mentioned in this article:*

Rotary Wing Concepts, 1201-D Ale West Carrollton, Ohio 45449, (513) 866

Engine Review



MAX-61RF.ABC-P. Built-in diaphragm type fuel pump and large O.S. Type 86 carburetor provide immunity from effects of variation in fuel head, plus extra power.

SPECIFICATIONS

Type: Air-cooled, single-cylinder, rear (side) exhaust, two-stroke-cycle, with crankshaft rotary-valve and Schnuerle scavenging. Built-in fuel-pump/pressure-regulator unit.
Bore: 23.0 mm (0.9055 in.)
Stroke: 24.0 mm (0.9449 in.)
Displacement: 9.971cc (0.6085 cu in.)
Nominal Compression Ratio (full stroke): 11.8:1
Speed Control: O.S. Type 86 adjustable automatic mixture control carburetor for pressurized operation only.
Fuel Pump: O.S. Type PD-02 diaphragm type with automatic fuel pressure regulator.
Checked Weight: 573 grams—20.2 oz.
Mounting Dimensions:
Crankcase width: 42mm
Length from prop driver face: 104mm
Height above C/L, less glowplug: 81mm
Mounting hole spacing: 52 x 25mm
Manufacturer's Claimed Power Output: 2.0 bhp at 16,000 rpm
Manufacturer: O.S. Engines Mfg. Co. Ltd., Higashisumiyoshi-ku, Osaka 546, Japan.
U.S. Distributor: Great Planes Model Distributors Company, P.O. Box 4021, Champaign, IL 61820.

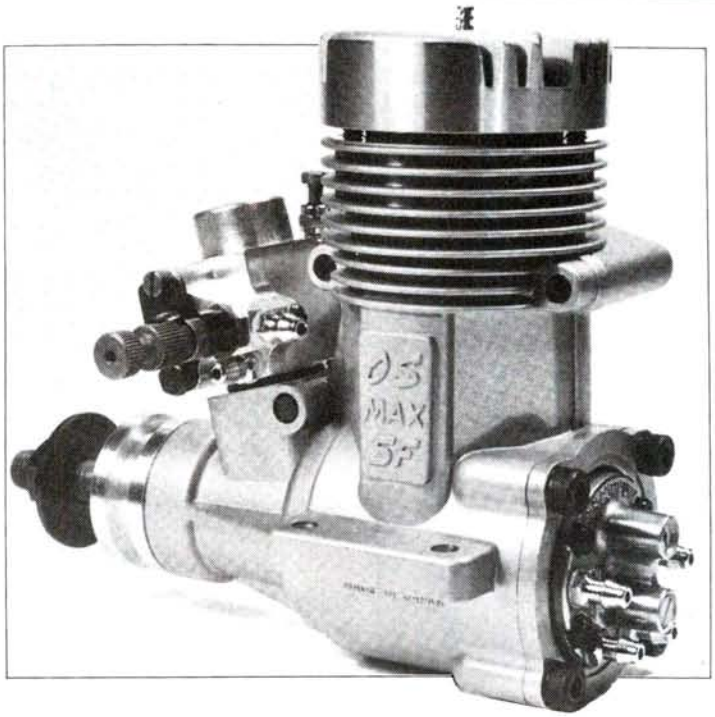
O.S. MAX-61RF ABC-P

new generation O.S., new carb, new power.

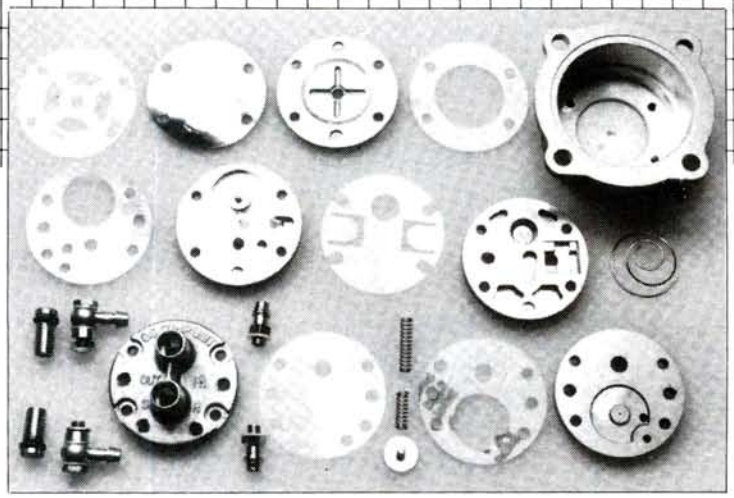
by PETER CHINN

REPLACING the well-known O.S. Max-61VF engines, the new longer-stroke Max-61SF and Max-61RF series engines now number eight different models. These give the user the option of a side-exhaust (SF) or rear-exhaust (RF) layout. They also provide a choice between a standard ringed-piston/ferrous-cylinder combination and O.S.'s special version of the "ABC" system, using a close-fitting ringless aluminum piston running in a brass cylinder-liner with special all-over ultra hard wearing electroless plated surface. Finally, each engine is also available with the new and very sophisticated O.S. PA-102 Pump System. Engines having this feature are identified by the additional suffix letter *P*.

A similarly complete choice of eight variants is also listed by O.S. in their new long-stroke Max-61 helicopter engine range. With the "P" series helicopter



MAX-61SF-P shown here is a side exhaust version of 61RF-P. Recent modification is use of angled (instead of straight) nipples on left side of pump (see photo of pump parts) for more compact plumbing.



Don't disassemble your PD-02 pump! It may never work again. Look at the photo instead! Pump/regulator unit is factory-sealed for best performance.

engines, however, the slightly different PA-101 Pump System is used. This features a separate (rather than built-in) pump and a different carburetor. More about this in a later article.

The PA-102 system used by the regular "fixed-wing" engines consists of an O.S. Type PD-02 fuel-pump/pressure--regulator unit that is built into the engine's crankcase backplate, plus a special carburetor, the O.S. Type 86. The pump equipped engines are around 25 percent more expensive than the standard suction feed engines, so what advantages do they offer?

To understand the answer to this question, one needs to know how a standard model fuel system works. The following paragraphs are mainly for the benefit of readers who are not too sure about this.

The most basic form of carburetor consists of an air intake tube and a fuel jet within it—usually situated about halfway along its length. Air is drawn through the intake tube by the suction created within the engine by the movement of the piston. Usually, the intake is narrowed in the vicinity of the fuel jet to form a choke or venturi tube, or is otherwise constricted by the jet assembly, and this causes a speeding up of the airflow. Just as a speeding up of the airflow over the cambered upper surface of an aircraft wing causes the pressure drop that provides lift, so the speeding up of the airflow through the carburetor intake causes a pressure drop that results in fuel being sucked from the fuel jet. The fuel is thereby sprayed into the airstream to form the explosive gas that drives the piston down when ignited in the combustion chamber.

It is vitally important that the amount of fuel released by the jet is proportional to the amount of air drawn into the engine. The *mixture strength*, as it's called, has to be maintained within quite narrow limits if the engine is to function properly. If the mixture is too weak or "lean," the engine will run hot and may eventually suffer damage through overheating. If it's too rich, the engine will lack power. If it's very lean or very rich, so that it is outside the combustible mixture strength range, the engine will not run at all.

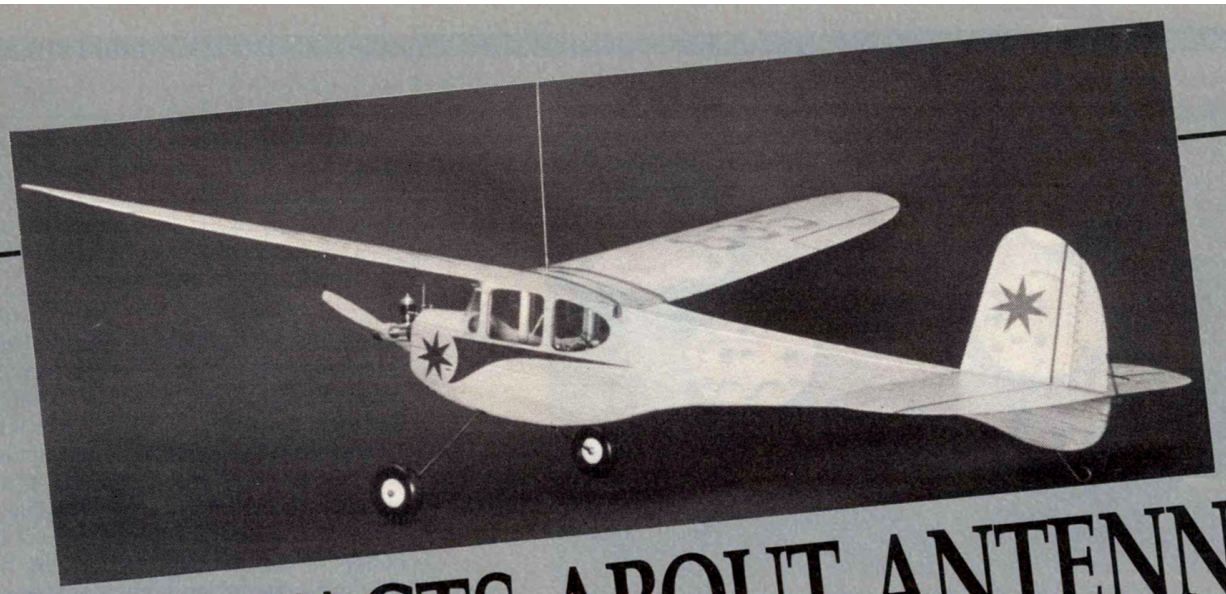
It is to enable the mixture to be correctly adjusted that our model carburetors are provided with a needle-valve through which just the right amount of fuel is released. However, there are outside influences which can upset mixture strength irrespective of how carefully the needle-valve has been adjusted. For example, the usual position for the fuel tank is immediately behind the engine and this means that in a dive there is a "head" of fuel that increases delivery pressure at the jet and tends to make the engine run rich, whereas in a climb the opposite is true and the engine will starve and run lean or cut out. A similar situation arises if the design of the aircraft requires the fuel tank to be placed too high or too low, so that variations in fuel head are increased by centrifugal force during aerobatic maneuvers.

To minimuze such effects, it is customary for the carburetor to have a relatively small choke area in order to create strong fuel suction. Such restriction, however, means that the engine cannot breathe so freely and power output is lower than would otherwise be the case.

Parts of the O.S. Type 86 carburetor. Massive intake for optimum power. Will operate only in conjunction with PD-02 pump unit. Simple to adjust. Latest production models have diecast body, instead of machined body shown here.

The answer to this problem is for the fuel to be delivered to the carburetor under pressure so that the engine is no longer solely dependant on suction feed. A simple way of achieving this, with a two-stroke-cycle engine, is to use the pressure created within the crank-case to pressurize a sealed fuel tank, but this is not satisfactory for throttle-equipped R/C engines as it causes flooding at low speeds. A far better solution—one that has been used now for many years—is to

(Continued on page 94)



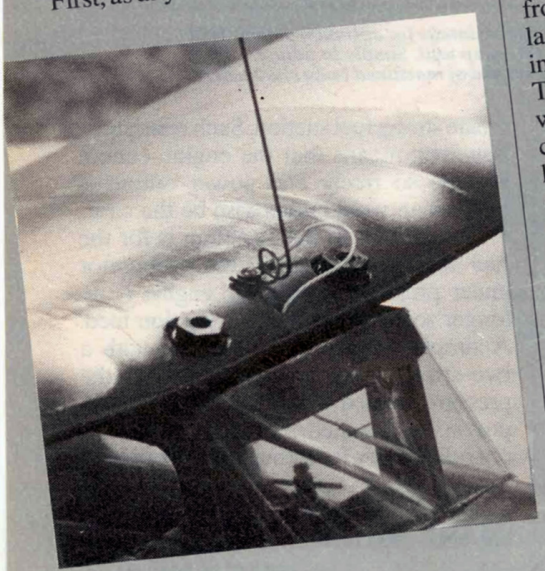
PLANE FACTS ABOUT ANTENNAS

"WHIP" YOUR RADIO INTO SHAPE

by JOE WAGNER

FOR A MODEL AIRPLANE to be controlled by radio, its receiver must respond to its transmitter's signals—and only to these. The receiver's sole input for the transmitter's signals comes from its antenna. That's merely a simple length of wire, but it is largely responsible for the controllability and safety of the aircraft.

Simple as it is, however, an R/C antenna has some unusual characteristics. First, as anyone who has ever set up a TV antenna knows, the signal reception isn't equally effective in every direction, and a single-wire antenna is among the most strongly directional of all. Radio direction finders used in navigation take advantage of this. The direction finder's antenna is rotated until the incoming signal is *weakest.* The antenna is then pointing directly at the transmitter to which it's tuned. This characteristic can give us trouble with our radio-controlled airplanes. Consider a model with the usual type of antenna: a length of flexible wire extending back from the cabin to the fin. In takeoffs and landings this antenna points rather closely in the direction of the pilot's transmitter. This means its received signal strength is weakest then—just at the time when control is most critical. I'm not talking here about a difference in signal strength of a few percentage points. The variation between maximum and minimum receptivity is *twelve to one* for a straight-wire antenna. This applies to the transmitter antenna too. The signal it sends out at a 53 degree angle (the direction of maximum output) is twelve times as strong as is produced along the antenna's axis.



An externally connected whip antenna set-up. The coil reflex loop turned out to be unnecessary.

This model's whip antenna is tied to a dummy scale-type mast with a bit of fuel tubing.

Thus, if the antennae of your airplane and transmitter are pointed at one another—as they sometimes are with conventional antenna arrangements—the receiver gets less than one percent of the signal strength that it could obtain with optimum orientation.

The fact that our receivers usually continue to work under such adverse conditions is a tribute to their Automatic Gain Control (AGC) circuits, which electronically adjust the amount of signal amplification. These are mighty effective, but not infallible. Now, an R/C receiver *wants* to pick up its transmitter's signals. That's what it's designed to do and tuned for. When an adequate signal is coming from the antenna, the receiver does what it's supposed to, accurately sorting out the various pulses and translating them into commands to the servos. Everything works well, and the airplane responds to its pilot.

(Continued on page 82)

How To:

by RANDY RANDOLPH

BUILD A CG LOCATER

The proper longitudinal balance of an airplane is extremely important. The location is always shown on plans as the balance point or CG. This simple stand makes an easy job of achieving this fore and aft balance. The photos show the way.

1. To balance the average sport plane the materials needed are: a 12-inch scrap of two-by-four, two 12-inch lengths of 3/8-inch dowel, two pencil erasers and a 3/8-inch drill.

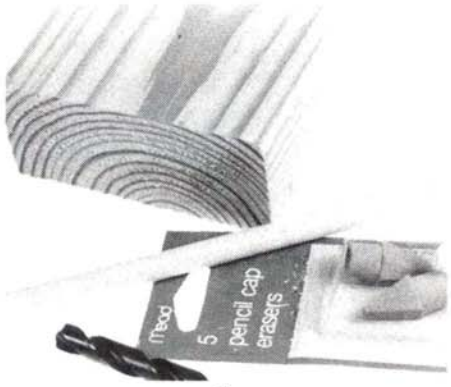
2. Measure and mark a 5-inch space across the center of the two-by-four. For airplanes with a fuselage cross section wider than this, the spacing should be changed to accommodate them.

3. Locate the center of the marks and drill a 3/8-inch hole, 1-inch deep at each mark. If the holes are not the same depth the dowels will have to be trimmed so that they are the same height above the two-by-four base.

4. Slip a pencil eraser on the end of each dowel and place the dowels in the 3/8-inch holes; it is not necessary to glue them. The erasers should have their thinnest edges parallel to the 12-inch dimension of the two-by-four base.

5. When balancing an airplane make sure the base is exactly across the fuselage so the erasers are in the same place on each wing in relation to the leading edge.

6. Low-wing airplanes can be more easily balanced if they are placed in the stand upside down. Position the airplane with the erasers at the balance point shown on the plans, then add weight to the nose or tail until balance is achieved.



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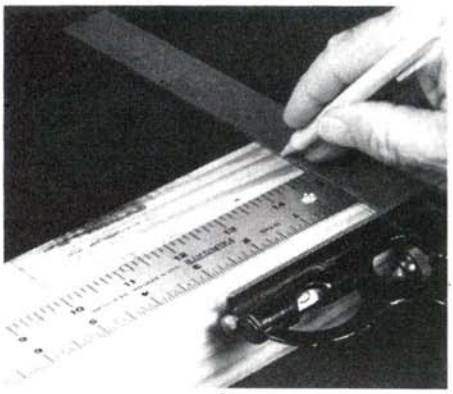
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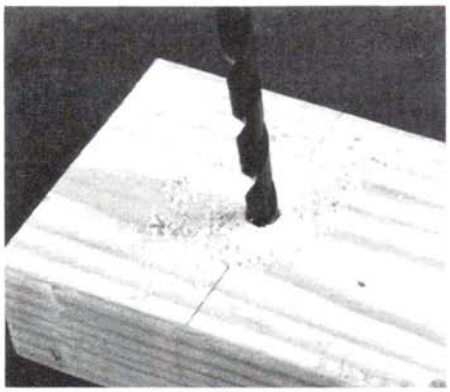
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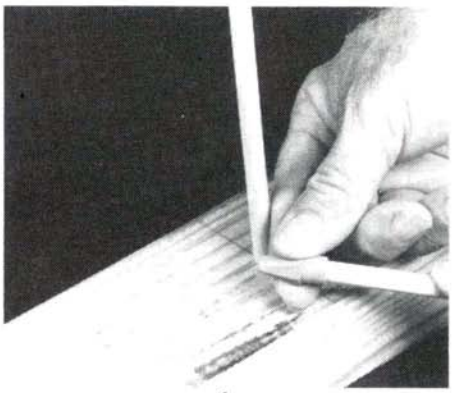
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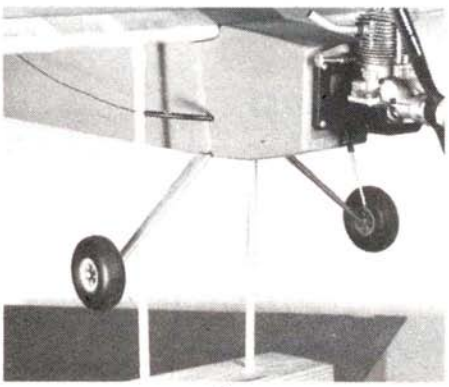
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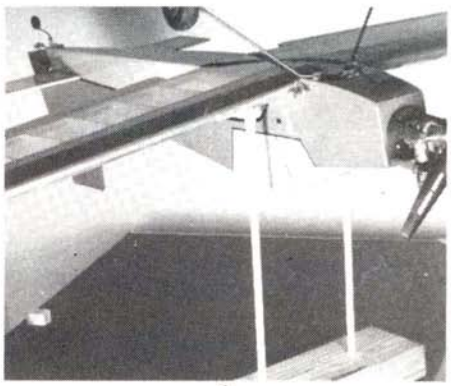

6.

by HAL "PAPPY" DeBOLT

ROAD RUNNER

Versatile, easily built sportster for .40 engines!

MOST R/CERS TAKE great pride in a special plane which they've put much effort into. It's not something to tear up the sky with on the slightest whim. We like to have something in the stable to grab quickly and get some flight time with. The Road Runner is the answer to your designer's need for a quickie and it has developed to meet several other desires.

After so many years of procrastination, the AMA has seen fit to recognize the popular Sport Pylon Racing as a national event. This year, for the first time, this class was flown at the Nats. Great, of course! So, if we're to have a "sport flyer," why not design it to meet these new rules? Why not have a combo model, just in case there's an urge to try some racing. The Road Runner fits these new rules.

Rossi Road Runner. Design flexibility allows builder to choose either 2- or 4-stroke engines.

Perhaps you've wanted to try 4-cycle engines. For a simple exploration of this new phenomenon, reports indicate that the Enya .46 4s is a fine 4-stroke. A look at the plane needs for this engine quickly shows that a Sport Pylon size is ideal for general sport flying. Why not include the use of an Enya in our combo project?

One obvious feature of most sport racers is the simplistic, austere appearance—not something to grab attention on the

Type: *Sport Aerobatic/Pylon*
Power: *.40 2-cycle, .46 to .60 4-cycle*
Span: *51 inches*
Wing Loading: *17.29 ounces/ square foot*
Weight: *3¾ pounds*
Channels Required: *4*
Wing Area: *500 square inches*

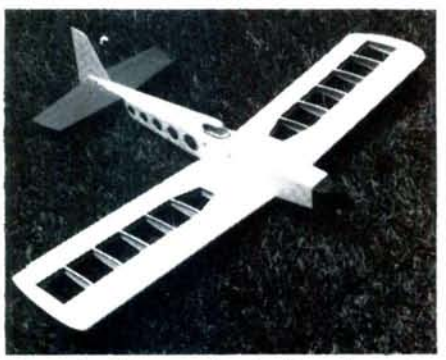
flight line! With the Road Runner, note how the addition of a turtle deck and wheel pants changes the picture. Most observers would not recognize it as a potential racer, but rather as a sexy Sunday flyer! You take your choice, full dressed or just the skivvies!

We now have a considerable amount of flying completed with the prototype Road Runner; all combos have been tested thoroughly. Let's talk about the unexpected first. If you read all the hoopla about 4-cycle engines, one quick impression is that they are great for slow flight and where good lugging power is desired. However, there are reports of excellent pattern flying with the larger sizes. How about the medium range? If others have seen the results that we have, long live the 4-strokes! With the Road Runner, flying speed appears to be about three quarters of what was seen with a racing engine—a really comfortable pace. After that the lugging power of the 4-stroke shows strongly. All maneuvers compare well with 2-cycle performance, the engine pulling steadily through the vertical stuff. It's hard to see how anyone would want more for sport flying. Best of all for the budget might be getting almost two flights out of the 2-cycle size fuel tank! If there are any shortcomings it's trying to hear the engine when sharing the sky with a 2-cycle! The decision to evaluate the Enya in a Sport Pylon size model proved excellent. It even seems that 4-cycle racing would be neat—slower paced.

We heard so many exciting reports on the new Rossi .40 engine that we just had to use it for the racing evaluation. All we can do is substantiate what others are saying. The engine is a jewel. The Road Runner goes like stink when the Rossi is propped for racing. The combo works just fine. This also being an

aerobatic type, there was the opportunity to evaluate the Rossi for other than racing. This was another surprise. With a .60 size prop, the tach showed RPM comparable to many of the big engines. Happily, the Rossi seemed to like the big prop just as well as it liked the racing size. With the higher speed, maneuvers come with definite authority and there is no lack of power to do anything you can dream of. Again there is a shortcoming with noise, but this time just the opposite from the Enya. The stock Rossi muffler does little in the way of quieting and sure lets you know that this is one powerful engine!

Two factors led to a third evaluation. First, a desire to reduce the noise level. Second, it's apparent that some racing areas allow the use of tuned exhausts in Sport Pylon. In the past we have seen much good in the Magic Mufflers; with the passing of time we wondered about improvements. So, we equipped the Rossi with the latest Mac's Muffler tuned exhaust. Static tests were eye opening. With a 9 x 7 racing prop our stock Rossi tached 16,000 RPM with or without its muffler. With the Magic Muffler the RPM jumped to 17,500. Fuel was red Max 10 percent. What impressed us more was the stock engine turning an 11 x 7 pattern prop at 13,000, then seeing an increase to 15,000



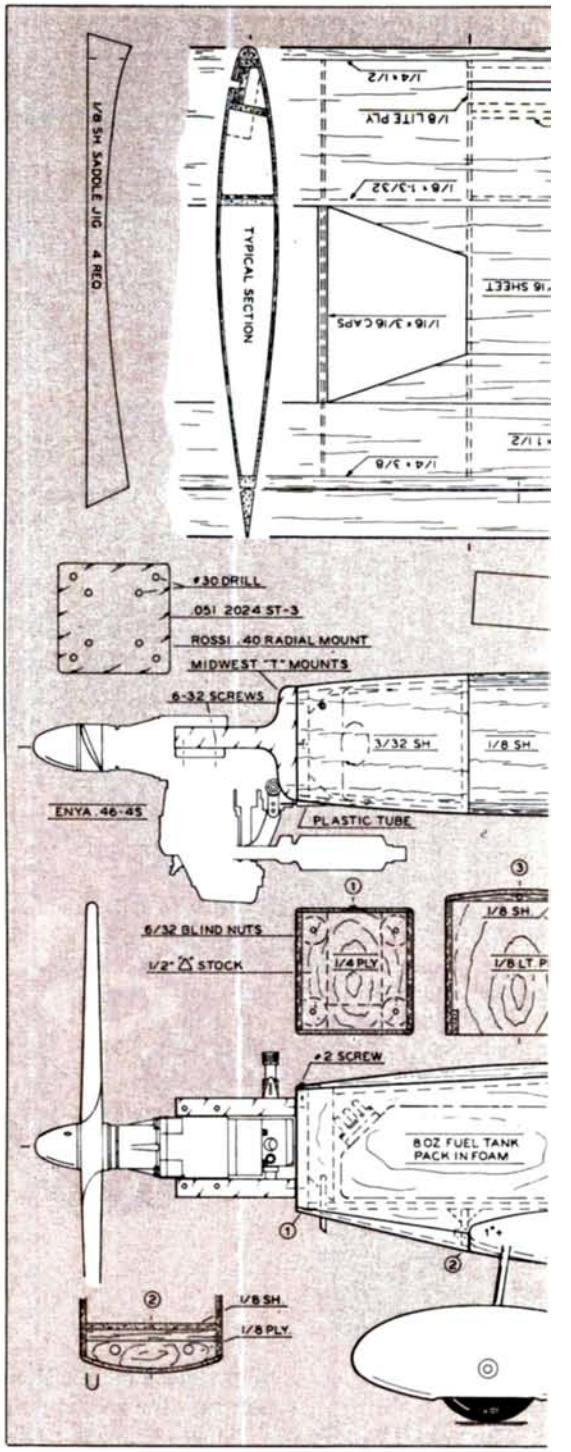
Conventional framework patiently awaits covering.

Pappy holds his latest pride and joy. His designs have worked well for years.

with the Magic Muffler!

Of course, flights showed an increase in speed which is not easy to appreciate when the Road Runner is already going like stink. However, it could easily be welcomed on the tenth lap of a close race. Also good was a dramatic reduction in the noise level, probably down close to that of the 4-cycle. An appreciated improvement! Again, you don't get something for nothing. The Magic Muffler exhaust system weighs 6 ounces. Adding this to the robust Rossi weight brings a power plant weight of 22 ounces and it's only a .40! But if you're looking for the ultimate speed, the cost becomes negligible.

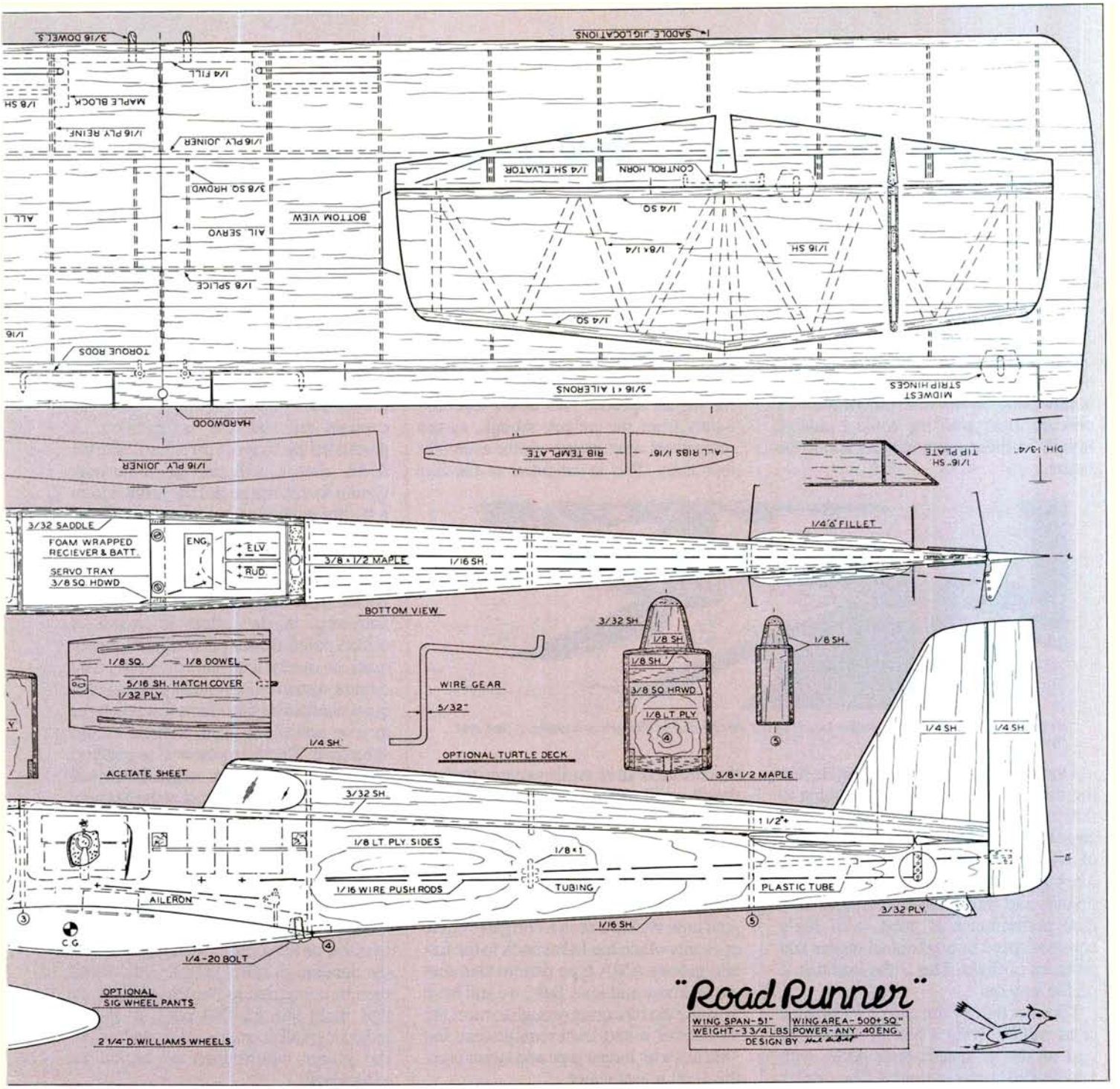
So what about the Road Runner design? After all these years the basic layout of a sport racer is pretty well fixed, but some minor points increase superiority. For example, the NACA 65012 symmetrical, laminar flow, low drag airfoil is used. Set at 1 degree positive, the flight line will present minimum drag. The positive set stabilizer assures an equal porportion between wing and tail lift. With this, changes in flying speed require no trim adjustment. The wing-mounted landing gear's wide stance provides good ground handling and is probably a bit lighter than a fuselage mount. Otherwise, the layout



Radio installation is neat with sufficient space for standard servos.

follows proven practice within the confines of the strict rules governing Sport Pylon.

With a simple structure, and no need to get into the "glue A to B" routine, let's cover the project piece by piece, as it could be more helpful.



RADIO: Only a common 4-channel system is required. Note that there's ample space for any modern system. There can be a vibration factor in these high-powered rather small designs, so the use of servo mounting trays to isolate the servos is strongly recommended.

ENGINES: The original intent, with our curiosity about engines, was to have a sport model capable of using a variety of power plants. The Road Runner will provide excellent performance with any .40 size engine. Use the one of your choice and try others at will.

ENGINE MOUNTS: In a structure photo, note the installation of the very clean Fourmost mount. This mount will accept most of the common .40 sizes, such as K&B, S.T. and O.S. The attachment bolt pattern of this mount is used and adapted to all other mounts. The Enya 4-cycle and the robust Rossi are in another ball park when compared to the usual .40s. We found that the Midwest T-Mounts fit the needs of the 4-cycle. There is a need for simple alterations to gain clearance for the carburetor and

(Continued on page 58)

Pattern Matters

by MIKE LEE

AFTER SOME CAREFUL thought about the latest Masters tournament held in Virginia last June, I am going to make some predictions for the future of FAI Turnaround. Some of these observations are simply the handwriting on the wall; others are a bit obscure. Bear with me while I indulge myself in these premonitions about the future.

Steve Helm's "Aurora" is representative of the direction FAI Pattern is leaning... fast and clean!

One of the most obvious things is that the ships we are using now are going to fade away fast. Most of us are flying fairly large birds with about 800+ square inches of wing and medium to thick airfoils. They typically weigh about 7.75 to 9.0 pounds and travel about 100 mph. Vertical performance is good, with fairly constant speed throughout all modes and attitudes of flight. This is the bird that is on the way out.

I predict that by the end of 1988 most of us will be flying a typical AMA type bird at slower speeds than AMA with maybe a bit longer moments. The smaller AMA bird fits the FAI style just fine, and to be really competitive at any given time at any given place, this bird will prove to be superior to the larger bird in current use.

At the 1987 Masters event, we experienced cross wind conditions that really tested the big birds in their ability to hold headings and perform smoothly. They were no contest to the faster and cleaner birds flown by almost all the top ten finalists in this event. Of the top ten birds, three were the Aurora design, three more were of standard AMA bird proportions, and the remaining four were not very far off from the AMA norm. Only one bird, a Zlin 526 of Donny Weitz, was larger and slower than the rest.

Notably, the top ten pilots also flew their birds farther than the 450-foot marker, indicating a need to compensate for higher speeds. This didn't lose any points from the judges, though, as the maneuvers were plainly visible even 600 feet away. This is indicative of the fact that the box can be easily violated though the pilot will suffer no downgrade as long as his maneuvers are easily displayed.

This brings us back to the prediction made here in this column some three years ago when I said there was no need to trash an AMA bird to fly turnaround. And now we have seen a complete circle of events which has led us back to the fast and groovy AMA type pattern ship that we all know and love. Sure, we still have to make the bird quiet enough to meet the 98 decibel sound level requirement, but with just a bit longer pipe and larger prop, this level is easily met.

Now, the prediction is taken a bit farther by saying that by the time the next Masters tournament is held in 1989, almost all participants will fly much faster ships and utilize about 750 square inches on the wing. The overall shape will be very clean with little if any of the engine and exhaust hanging out in the breeze. There will be a return to tricycle geared aircraft as weight will no longer be as great a factor in the aircraft's design. They will still weigh in at less than 9 pounds, but not near as many will be as light as 7.5 pounds. And you'll see the return of the use of dual rates during the pattern in FAI.

Another prediction for the future FAI pilot will be the emergence of the lower classes of turnaround, similar to the current AMA class structure. This will be a necessity as the current training ground for our FAI pilots is simply to go to the contests and see the competition. A graduated proficiency structure, like the AMA classes, will provide a farming system for the future and the result will be a higher caliber of contest pilots within their ranks.

As for the rules in FAI, I think a couple of them will find their way out of the books. The first one to go will be the allowance of the judges to award or deduct points from a pilot's flight for very quiet or overly loud aircraft noise. The current system which allows a pilot with a quiet plane to be awarded extra points, or to lose points for loud engines, is too subjective. The mere power of suggestion can persuade judges to make the award or deduction. This was seen at the Masters where a judge got up from his seat and commented to the other judges about how he thought the plane they were just judging was quiet. This ruling, if allowed to continue in practice, should be left to the individual judge who should mark a decision on his score card independent of the opinions of other judges. This would then be compared to the other judges on that flight line for that pilot. If all the judges agreed to an award or deduction, the points would then be added or subtracted.

Another rule that may drop would be the outer marker distance of 450 feet or 150 meters. As has been proven in the past, most world class pilots blatantly ignore the distance and are seen quite a ways beyond the marker. To be judged accurately, maneuvers should be performed in plain view of the judges. Maneuvers which are performed at great distances plainly indicate a pilot's effort to hide defects by using distance and should be downgraded.

Lastly, I see an end to the use of 4 strokes for pattern competition. Of the 45 or so birds seen at the Masters, less then

half a dozen were powered by a stroker, and only one managed to make it to the top ten. This is not to say that the 4-stroke engines are not suitable for competition, but as a pattern powerhouse they lack the guts that have made the piped two strokes so famous. And, they only approach the two strokes in power when used in virtually double the displacement. Not a very good trade-off when weight and noise are considered.

Whether or not these predictions come true, only time will tell. But there is no doubt that pattern is on the move again. It will be interesting to see what does happen in the future, especially as it affects lower classes of competition in turnaround and AMA. I see the day when AMA classes will merge with turnaround. Stay tuned for that.

In our tech talk this month, Layne Johnson of Truman, Minnesota, wrote to ask the advantages of the thicker vertical stabs used in many newer designs. Layne is modifying a SIG Kougar to use a thick stab, but wants to know why before he does. OK, Layne, I hope this explains my reasoning for it.

The vertical stab in an aircraft is used to maintain its lateral stability. Now it's true that the fuselage and tail give directional stability and can be used to provide lateral stability in flight, but only at a given speed. This speed is usually somewhere above our speeds used for take-off and landing. Well, you have to get the ship airborne sometime, and the landing will follow a short time thereafter. Therefore, the need for a vertical stab with enough area to provide stability at all flying speeds is necessary.

National Champ Chip Hyde and his dad with the LA-1. Slightly larger than standard AMA bird.

Don Weitz with his Enya 120R Enya-powered Zlin 526. Sole 4-cycle scale ship in top ten at 1987 Masters.

The use of a thick vertical stab versus a thin vertical stab will assist in making a smoother yaw motion when the vertical stab is used as the rudder. Thin stabs will suffer from boundary layer separation in the air. This phenomenon happens when the air is cut by a thin leading edge of the stab itself. The air flow will not flow cleanly over the rudder, and normally will hit only the rearward portion of the rudder. The effect produces a rather nervous jitter from the tail when the rudder is kicked at high speeds, plus a feeling of a vague or ineffective rudder.

At lower speeds, the same rudder requires a bit more air flow to provide the lateral stability to the airframe than the thicker one. The result appears to be a bit of a wag when exiting stalled maneuvers.

The thicker stabs are more effective because they are usually airfoil shaped for better overall effect. While we will not discuss the design of the airfoil here, let it suffice to say that the thicker airfoil design provides much better air flow over the surface than a thinner stab with no airfoil. The airfoil allows the air flow to remain in contact with the surface longer despite deflections made by the rudder. The result is more undisturbed air flowing over the rudder, and a more positive rudder effect. The airfoil also provides stability at lower speeds than non-airfoiled surfaces, and is thus able to prevent that vague rudder feeling and tail wag.

This same effect is also used in horizontal stabs. Airfoiled horizontal stabs provide far more effective elevator response with less elevator control surface throw. When you use less throw to accomplish the same desired effect, you compromise the airframe design less and the airframe is thus more efficient. Talk to the sailplane guys about that subject and you'll end up with a two-hour lecture on airfoiled tail surfaces. If anyone knows how effective an airfoil is on the tail feathers, it will be the sailplane and free-flight guys.

As for the airfoil shape itself, I cannot make too much of a comment on that because I haven't studied them. I can say that early pattern designs (we're talking about the Taurus, Mach One, and others of that era) sported a diamond-shaped airfoil. They were far more effective than the standard stab surfaces used up until then. Later on it was found that any airfoil worked better than no airfoil on the stab, but that the symmetrical shaped airfoils were preferred because of their characteristics when the ship was inverted versus upright. Flat-bottom stabs worked well upright and gave you hell when inverted. They also caused trim changes when the speed varied.

As far as the best airfoil shape to use for the tails? Geez, guys, I'm open for suggestions. Just make sure that it's symmetrical.

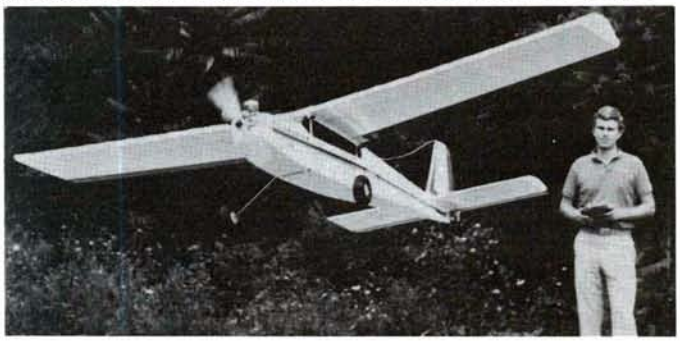
By the time you read this, most of you will be preparing to mothball the bird for the winter. For those of us in the sunbelt states, we will be entering our winter season of flying. Just take note that sun belt or snow haven, take care that you store and handle those model items the right way. Don't store fuels near sources of heat or fire. Toss away those old cleaning rags rather than save them for next season. And definitely don't wash them with chlorine bleach unless you like chlorine gas floating around the washer. Keep things safe and you will find that flying is no sweat come next season. Till then, we're on the pipe and airborne. ■

NEW! RC trainer **SNAPS** together in a jiffy!

HLA124 **MINI SUPER-TRAINER $38.50**
List price $49.50

47" wingspan. The wings come pre-sheeted with veneer - just join them together. The fuselage is "Snap-together" light plywood. Mini Super-Trainer is for 3 channels of RC control (rudder, elevator, and throttle) and for engines in the range of .09 to .15. The airplane is a good trainer because it's stable. Also, by omitting ailerons which are something of a chore to install and hook up, and by having a rigid fixed nose gear (steerable ones take time to hook up) Mini Super-Trainer usually gets built and flown before some of its competitors make their way out of the workshop.

We designed this RC airplane kit to be **easily built** by, and **successfully flown** by someone who has **never before seen** an RC airplane.



HLA010 **TELEMASTER 66 . . . $67.50**
66" wing span, 650 sq. inch area high-lift, flat-bottom wing; 155 sq. inch area lifting stabilizer (a total of 805 sq. in. lifting area! 10; 42½" fuselage length, for .10 to .40 size engines and 4 channel RC controls. Flying weight about 5.1 lbs.

The kit has been designed so that the parts fit together like an interlocking puzzle. The assembly time for the "Snap-together"main fuselage structure is about 15 minutes. The assembly time for the "Jig-Spar" wing halves is about 15 minutes each.

HLA010AP **ACCESSORY PACK for Telemaster 66 . . . . . $33.79**

NEW! *You have not seen an RC airplane do a* ***realistic landing*** *until you've seen* ***TELEMASTER 2000 land with full flaps!***

HLA106 Hobby Lobby
Telemaster 2000 . . . . . Introductory PRICE $189.00
List price $279.00

The remarkable thing about Telemaster 2000 is **the way it lands** with flaps extended. While the airplane is many things — aerobatic, a trainer, sharp-looking — it is what it **does** during final approach that is its particular charm. The Telemaster 2000 in the photo above is about 1" off the ground on final approach with full flaps. The elevator is almost neutral, engine at idle, and a perfect reenactment of a full-scale aircraft landing is happening. Telemaster 2000 is a conventional balsa and plywood RC airplane whose main structures are pre-built. As you will receive it the airplane is about 90% completed. It has a 2000 millimeter wing span (78"), wing area of 875 sq. inches, fuselage length of about 52". 5 RC channels are desireable so you can have wing flaps. The best engine size in it is a .46 4-stroke but it will fly with .40 to .60 2-strokes and .40 to .90 4strokes.

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Jet Blast

by RICH URAVITCH

I'VE RECEIVED a lot a mail this month and that's very encouraging. The Southwest Fan Fly is behind us and I'll be bringing you expanded coverage in an upcoming Jet Blast. I mention this event because there are a number of stories surrounding it, one of which I'd like to relate now because it clearly shows the brand of camaraderie and friendship that we fan fans share. As some of you may know, I don't usually fly at these events because I'm usually running around taking pictures, gathering information, or generally learning what other modelers are up to. This year was going to be different... I was going to bring an airplane! Having just completed my Jet Hangar Hobbies* F-86 Sabre, I was putting the fifth test flight on it the *day before* my departure for the Fan Fly. As luck would have it, the spinner parted company, stayed in the duct, and literally ate the rotorblades. The deadstick was accomplished with no additional damage.

Back home, I placed a few frantic phone calls to Mike Kulczyk and Lyn McCauley in Texas, who, in turn, probably each called another half-dozen modelers. Mike convinced me to put the airplane into its shipping crate and bring it down; we'd work it out. I also called the Turbax's manufacturer, Larry Wolfe of Jet Hangar Hobbies, explained my dilemma, and asked what could be done. Here's the bottom line: Larry Federal-Expressed a pre-balanced rotor from one of his airplanes to Texas, and it was waiting for me. I had offers of loaners from at least three different guys at the Fan Fly. One flyer, a friend of Steve Korney (Hurricane Fans), did in fact lend me his after he had unfortunately trashed his airplane. This is friendship and factory support at its greatest; it's terrific to be part of it. Incidentally, Larry has relocated Jet Hangar, so note the new address. Oh, yeah... the F-86 was much easier to fit into the crate for the return home... much smaller package! Rolled into the ground on take-off! Maybe I *should* just report on these meets!

Custom R/C Aircraft's single-engine F-4 Phantom. Uses Byrojet fan. Accessibility is very handy feature of design.

George Miller of Custom R/C Aircraft* sent some information on his single-engine F-4 Phantom. It uses the proven Byrojet/Rossi power package and George has designed the fan installation so that the cylinder is upright and accessible. No need to invert the model for starting either, which is kind of nice. Performance should be excellent at the 10- to 11-pound recommended weight. George says the Rhino is airborne off grass in 200 feet, about half the distance off prepared surfaces! Sparkling! Two versions of the kit are available: a sport scale, and a precision scale, the difference being the inclusion of additional surface detail like AIM-7 troughs and inlet ramp-splitters on the precision versions.

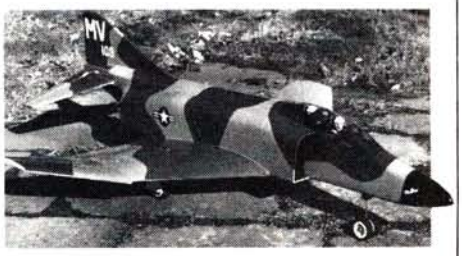
George is currently working on a F-8 Crusader which is designed for the Force Air One fan unit, and this raises a frequently asked question: "What can you tell me about it?" Answer? "Not much, really, except, that I invited the Force Air folks to send data which I could then present to you for evaluation. I still haven't received any info but Pat Grubb from the Sacramento area is preparing an article for us which will present a side-by-side *flight* test comparison of identical (except for power units) Parkinson Regal Eagles. One will use the Force Air fan with an O.S. .77, the other will employ the recommended Byrojet/O.S. .77 package. I've personally witnessed the flying of the latter and can attest to its performance. While this method of comparison may seem harsh to the new unit, it's the most effective and only *meaningful* approach to performance evaluation. In the meantime ... can *anyone* with direct, hands-on experience tell us interested fan folks what their experience has been?

Close-up of F-4 shows splitter and inlet with Byron pipe just peeking out.

Philip Avond's original F-15 Eagle. Meet FAI weight limit. Two Turbax Is with K&B 7.5s.

Ducted fans, as rather specialized items, usually require a significant monetary outlay since the modeler must buy the fan unit, a specific type of airplane and, in most cases, a high-performance engine. This can be expensive, so the last thing the modeler needs is a piece of the package that he bought while enraptured by numerically compared performance data, failing to do what he was led to believe it would do. As I, and other columnists have said before, talk with the guys who are flying fan airplanes, get their opinions, and actually *see* what you're planning to buy, *before* you lay your money down.

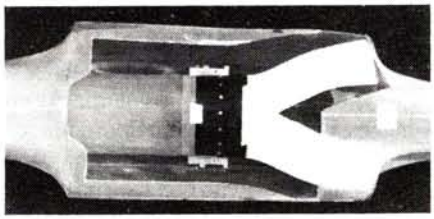
Mike Cuttitta of Hackensack, NJ, dropped me a note after we'd chatted at this year's WRAM show in White Plains. Mike was building a Ziroli F-4 at the time. It's now complete and, as you can see from the pictures, turned out well. One of the subjects we discussed was the need for inlet ducting on the F-4. It makes the a remarkable difference to the little Phantom, and the easiest way to accomplish it is to shape some foam to create a smooth translation from the inlets to the fan face, lay some glass-cloth soaked with epoxy resin on the shape, allow to cure and dissolve the foam out with a solvent. This technique is the best way to go on nearly any jet requiring an inlet, and is probably the *only* way to accomplish it on a relatively small airplane like the Ziroli F-4.



Mike Cuttitta's Ziroli F-4. These cuties are turning up everywhere!!

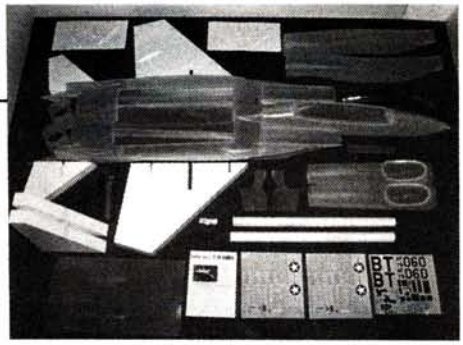
To give you an idea of how the "tailored" inlet can be made, look at the pictures provided by Sterner Engineering* showing how the inlet system was developed for their F-80/T-33 kit. This model was originally designed to use the Byrojet unit and did not use an inlet duct but drew most of its air through a cheater hole on the lower side of the airframe. A number of modelers had requested a conversion kit which would allow the use of the Dynamax fan in their Shooting Stars, so Sterner developed what you see here. This system eliminates the requirement for the cheater hole and this cleans up the appearance. A production system should be available as you read this.

Philip Avonds of Belgium sent some photos of his F-15 Eagle some time ago. It's scratch-built, Philip having developed the molds for all the fiberglass compo-



Prototype inlet ducting conversion for installing Dynamax fan unit in Sterner F-80/T-33.

nents himself. He competed with it at the 1986 FAI Scale World championships and, in fact, it placed sixth on its maiden flight! It's 1/9-scale with a length of 85 inches and a span of 57 inches. Now, *that's* a good-sized airplane, right? Here's the real kicker—it's less than 13.25 pounds! It had to be to meet the FAI limit. Philip used a pair of Turbax 1 units with K&B 7.5s and removed the tuned pipes to meet the weight limit. As you can see, the detail is unquestionably FAI-Scale caliber. Hot on the heels of Philip's letter came a note with pictures of Bill Hempell of the Hobby Barn informing me that Philip



Layout of Avond's Eagle Kit. May be available from Hobby Barn. See text.

Avond has produced a kit of his F-15 and that Hobby Barn would be the exclusive U.S. distributor. No solid price yet, but the pictures indicate that the kit is very complete and includes many fiberglass parts: fuselage, hatches, inlet and exhaust ducting. Flying surfaces consist of cut foam cores which the builder must sheet. It appears well-suited to any of the currently available 5-inch diameter fan units such as the Dynamax or Turbax I or III. Contact Hobby Barn directly for price and availability.

For all you guys who have been reading Jet Blast and haven't yet taken the plunge and joined our ranks, the opportunity is here! Remember, a couple of issues ago I mentioned a soon-to-be-released Nearly Ready-To-Fly jet with a proven fan unit for less than $500? Well, it's now a reality! The airplane is a fiberglass A-4 Skyhawk with pre-sheeted foam cores, the fan is the Jet Model Products Dynamax and the engine is the O.S. .77 fan engine with a tuned pipe. The price?—$470!!! The company is the Yellow Aircraft Co.* out of Canada. See their ad elsewhere in this issue, but hurry, as that's a special price and will only be offered to the first two hundred customers—actually 199 plus me! If that's not enough, their next release is scheduled to be a similarly-configured SR-71. You're all out of excuses.

For peak performance, stay tuned...

**The following are the addresses of the companies mentioned in this article:*

Sterner Engineering, 661 Moorestown Drive, Bath, PA 18014.

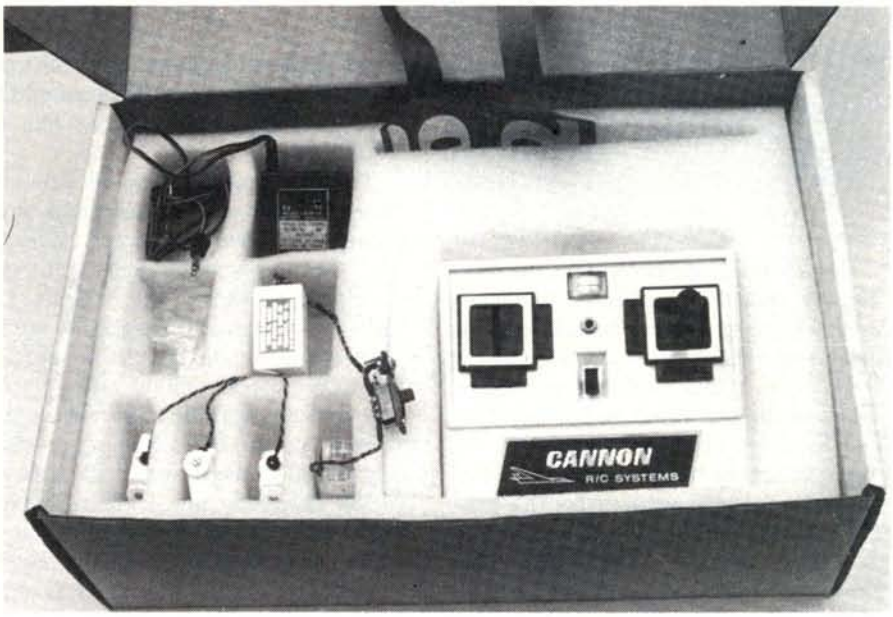
Jet Hangar Hobbies, 121308 Carson Street, Hawaiian Gardens, CA 90716.

Custom R/C Aircraft, 249 Robin Way, Santa Rosa, CA 95407.

Yellow Aircraft & Hobby Supplies Ltd., Suite 201, 3040 Palstan Road, Mississauga, Ont. Canada L4YZ26. ■

Small Steps

by JOE WAGNER

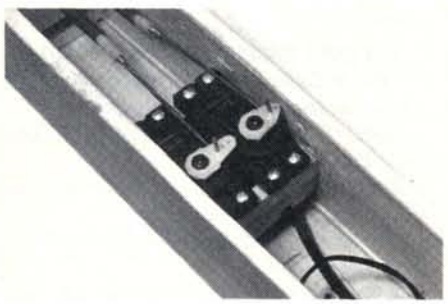


This is the way Cannon R/C systems are packaged: in foam rubber. Each component in its own cushioned pocket.

IN PAST COLUMNS Randy and I have often emphasized the importance of lightness in the successful flying of small R/C models. Several readers have asked me to be more specific on this point: how light exactly should an R/C model be? After all, it's impractical to construct an R/C airplane that's as lightly-built as an indoor rubber-powered model. What should the criterion be?

One key factor is wing loading. You've probably seen values given for this in discussions of R/C airplanes; so many ounces of weight per square foot of wing area is the way it's usually expressed. Unfortunately, this isn't truly an accurate standard, unless you're comparing models that are approximately the same size. Why? Because it fails to take into account the wing's thickness, which has a major effect on how much lift the wing produces.

There's a much better way of figuring wing loading for model airplanes. To distinguish this from the ounces-per-square-foot method, let's call it *volumetric loading*. Here's the way to calculate it. First we need a value for the volume of the wing. To get this, multiply the wingspan by the chord, then by the thickness of the airfoil measured at its high point. For *rectangular* wing planforms that's all there is to it. For tapered wings, use the average chord and airfoil thickness. *Curved* or elliptical planforms require more work. Figure the wing's area (by math or by plotting it on graph paper) and divide that by the span. This gives the mean chord. Then measure the airfoil thickness where the actual wing chord is equal to the mean chord, and multiply that by the area of the wing.



Regular-size servos can be used in small models, but usually the output "wheel" must be cut down to fit restricted space.

Now we have a "volumetric" value for our wing. It's not the true volume in cubic inches, of course, but that doesn't matter. Dividing it into the model's weight, we get a number we can conveniently use for comparing model airplane performance—and for models of any size, too. We'll call this number the *volumetric loading*.

Let's figure out an example or two. Flyline's* magnificent "Megowcoupe" kit design has 350 square inches of wing area, and its airfoil's maximum thickness is ¾ inch. That works out to a volumetric value of 262.5. Dividing this into the Megowcoupe's ready-to-fly weight of 16 ounces (with 2-channel Cannon Super-Micro equipment), we get .061 for the Megowcoupe's volumetric loading (VL). Next, consider my semi-scale "Grasshopper" modification to Ace R/C's "Air Scout" kit. It weighs 49 ounces. Its 500 square inch wing has an airfoil thickness of 1.07 inches. Using the same math as described above, the Grasshopper's VL is .091, and a 33-ounce "Gentle Lady," with a 663 square inch wing of ¾-inch maximum thickness has a VL of .066.

Here's what this means in terms of model performance. The smaller the VL number, the lower the airplane's stalling speed will be. (The top speed is determined mainly by the engine's power, of course.) A model with a VL of .05 is as light as you'll ever need to build for a schoolyard-type R/C model. Such a plane can fly as slowly as 12 mph without stalling. VL values from .06 to .10 are well within reason for small-field flying. They permit hand-launching without requiring a javelin throw heave. However, if your model's VL is much over .12, it's too heavy.

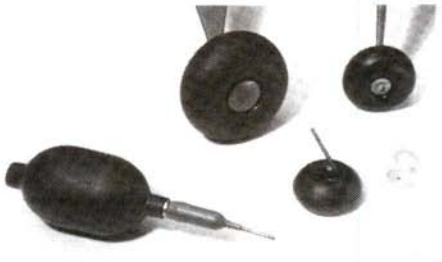
One of the best ways to keep your R/C models light is to eliminate unnecessary weight. For example, many brands of model wheels are far too heavy for small R/C airplanes, but Dave Brown's new "Lite Flite" wheels, and the inflatable balloon-tired wheels made by Trexler are ideal. No company has been making

model wheels as long as Trexler*. They started well before World War II, and have been at it ever since. The airwheels they make today look to me exactly the same as the Trexlers I bought when I was in Junior High School. Available from Sig*, they come in a wide range of sizes, from 1 ¼ inches to 4½ inches in diameter.

These wheels are extremely light, yet quite durable provided you know how to use them. First, never inflate them by blowing them up by mouth, like a balloon. I don't know why, but this always causes the tire's inflating stem to get brittle and crack. Trexler makes a rubber bulb type of inflator for their wheels, and using this to pump up the tires, keeps the stems flexible and leakproof. Second, deflate the tires as soon as you're through flying, and only re-inflate them when you're at the field for a new flying session. Third, before you inflate Trexler tires for the first time, remove them from their hubs and give them a thorough coating with "Armor-All," a rubber preservative you can buy at any K-Mart.

There's one minor fault with Trexler airwheels. Their wooden hubs (which are nice because you can paint them any color) frequently have off-center holes. However, this isn't hard to fix. First, drill out the holes until they are big enough to loosely accept metal tubing of the right size to fit your landing gear axles. Next, put the tubing in place, centering it as necessary with tiny wedges made from

Cox Hobbies' "Dragonfly" .049 R/C engine. It comes complete with a built-in clunk tank.



A sample selection of Trexler airwheels. The inflator has a brass tube insert for inflating the tiniest tires.

scrap wood or toothpicks. When the tubing is as close to being centered as you can tell by spinning the hub and eyeballing it, fill in the gaps with one of the higher-viscosity CYA glues. When that cures, the hub can be sanded smooth and painted.

Treated as I've just described, Trexler airwheels make marvelous lightweight wheels for R/C models. They're perfect for Piper Cubs, Porterfields, and other light planes that come with fat-tired balloon wheels.

Another weight saver is Su-Pr-Line's* "Nyrod." It's the lightest of the nylon tubing pushrods. This is important. Because pushrods are located behind a model's balance point, heavy ones can often force the addition of dead-weight ballast to the nose. Another thing I like about Nyrods is their positive control action. They're far better than balsa stick pushrods with offset music wire ends, which tend to flex when compressed.

Even though an R/C model may be lightweight and slow-flying, it still needs accurate and positive control. Any kind of unsupported pushrod, whether a length of music wire or a wooden stick with attached wire ends, is far more likely to give erratic control response than the Nyrod type. That's why I use nothing but Nyrods in my own R/C models.

Last August I was in southern California again, and while there, I visited the Cannon R/C Systems* factory in North Hollywood. I was extremely impressed by what I saw. Cannon R/C Systems is a genuinely model-oriented place. There are no fancy executive offices or designer-inspired interiors. Instead, the place is chock full of model airplanes, model magazines, and model R/C equipment. Bill Cannon, who runs the place personally, is an old-time modeler who still flies R/C regularly. On the wall of one big room in the factory hang over a dozen of Bill's small R/C airplanes. Bill designed most of these, and equipped them with all types of Cannon radio gear. He regularly flight-tests all his R/C equipment, flying mainly at Los Angeles County's Sepulveda Model Airport, which is probably the most demanding electronic environment possible for R/C models.

Cannon R/C's factory is a no-frills building, but the facilities inside are superb. Bill has the latest in instrumentation and test equipment, and he's constantly improving it. For example, Cannon R/C systems are given a ground-range test at 550 feet separation between transmitter and receiver. That's a mighty long distance! Bill showed me his latest Cannon R/C developments: his new receiver that meets the 1991 FCC narrow-band requirements, yet is no larger than his previous micro-size receiver; and his latest "910" type transmitters, which include servo reversing. This equipment is indeed outstanding—so much so that from now on I'm going to use Cannon R/C systems exclusively in all my small R/C airplanes.

**The following are the addresses of the companies mentioned in this article:*

Flyline Models, 10643 Ashby Place, Fairfax, VA 22030.

Sig Manufacturing Co., 401 S. Front St., Montezuma, IA 50171.

Su-Pr-Line Products Inc., 18800 State Rt. 47E, Sidney, OH 45365.

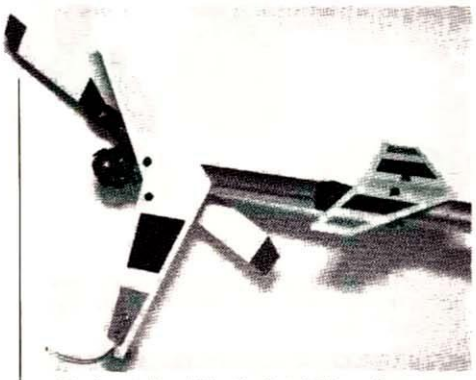
Cannon Electronics, 13400-29 Saticoy St., N. Hollywood, CA 91605. ■

Helicopter Chal

by CRAIG HATH

BY THE TIME you're reading this, the flying season for many of you will be over. Those of us who live in the desert southwest are just beginning our flying season, or are at least enjoying a little cooler weather to fly in, as we can fly just about year-round. Sorry, I'm not trying to rub it in! I'm just going to make a quick point about winter storage of your machines.

Be sure that you run all of the fuel out of your engine, and drain your fuel tank before you put the helicopter away. If you remove the glow plug and place a good load of after-run oil in the combustion chamber, turn the engine over a few times to allow the oil to run into the bearings and replace the glow plug. You will give the bearings a lot better chance of surviving without rusting until you fly again. It's also a good idea to charge the batteries fully on the radio system before storage. If you're using one of the new PCM radios which has a fail-safe memory circuit, you'll need to make a note to charge the transmitter overnight once a month to keep its batteries from going dead. Clean all of the dirt and grease off of the machine and re-oil all moving parts. Dirt can be a good place for moisture to be trapped, so do a good job. Finally, wrap the helicopter in plastic and seal it with some packaging tape or duct tape for its winter rest. With a little luck, you will be able to pull the machine out of wraps, charge the batteries, and fly this spring!



Horizontal and Vertical stabilizers from composite materials for Cobra available from Rotary Wing Concepts.

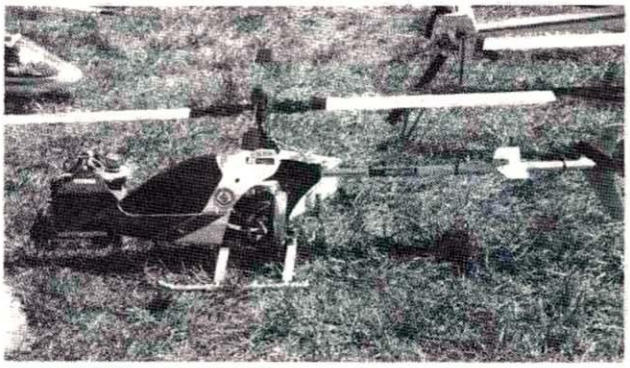
Last month we finished our discussion about the tail rotor linkage and simple flight trimming of the tail rotor sytem. The next step to fine-tuning your helicopter is to properly adjust the anti-torque mixing system which is probably incorporated into your transmitter. If you are using a radio system which is specifically designed for use with helicopters, you will more than likely have an electronic system for compensation of torque at the tail rotor. This sytem will usually be identified as the ATS system, AST, or some other similar group of initials. What this all boils down to is tail rotor torque compensation. For simplicity's sake, I will refer to the anti-torque system from here on in as ATS. Before we go much further, I would like to explain the function that this feature performs and clear up some misconceptions about the system.

Anti-torque systems have been added by the radio manufacturers to provide a means for mixing the throttle and tail rotor pitch in a manner which will prevent the helicopter from screwing itself into the sky or into the ground whenever the throttle is applied or removed. This feature must be adjusted to suit your helicopter and flying style. Often the description of the anti-torque system leads people to believe that there will be no need for a gyrosensor because the jobs of the two items are the same. In truth, the anti-torque system is not a substitute for a gyrosensor, and the end result is better if both systems are in use.

Anti-torque mixing systems only influence the performance of the helicopter momentarily, whereas the gyrosensor works continuously. Our discussion will focus on the anti-torque system for now with discussion about the gyrosensor to follow in the next issue. The reason both systems working in conjunction is best is that the gyrosensor cannot always eliminate the effects of torque during application or removal of throttle/collective. This point brings us to take a look at how the anti-torque system works.

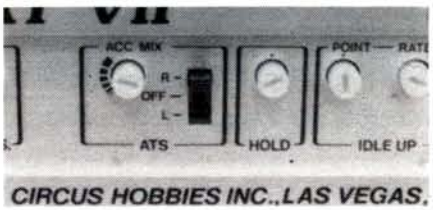
With the system switched on at the

Bob Pickens Cobra sits perched and ready for action. Helicopters have that look like they never rest, don't they?



This is Dan Melnik's Baron 55 at the AMA Nationals. It is capable of consecutive axial rolls from hover!

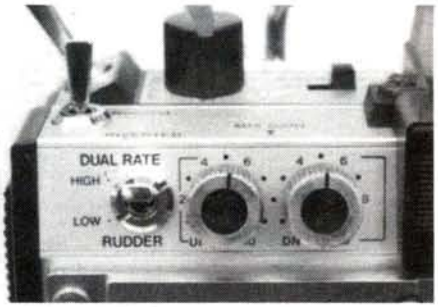
transmitter and all of the mixing controls adjusted for your helicopter (we'll get to that part later), as you open the thorttle/collective control on the radio, some tail rotor pitch will be added automatically by the radio to compensate for the additional torque which the engine places on the airframe. If you missed our discussion a few months ago, torque is the name given to the force which is a by-product of the power your engine produces. If the main rotor blades turn clockwise, the airframe will try to turn counterclockwise. The job



This is a look at both the ATS acceleration mix and on/off directional switches. Be sure to set the mix to full counterclockwise before attempting any adjustment of the system, as this adjustment comes last.

of the tail rotor is to provide a means for holding the nose of the helicopter straight ahead in spite of torque. Most of the torque compensation mixers will also provide a timing mix which will provide an overshoot of tail rotor pitch, which can fine-tune the system to allow for a heavy helicopter or a less powerful engine. This same system will also decrease tail rotor pitch as the throttle/collective stick is decreased and will usually even subtract extra pitch momentarily to compensate for the unloading of the airframe as the descent begins.

Once the system is correctly adjusted for your machine, the end result should be a helicopter which lifts straight off the ground (for the most part), and climbs straight away without tail rotor correction. The acceleration mixer can only be adjusted for one style of flying. For example, if your normal flying style is to gently lift-off and climb much like full-size helicopters, don't expect the ATS system to compensate for any hot dogging that



ATS up and down mix gain knobs from Century VII radio is typical for most radios on the market for helicopters.

you might do on occasion. The reverse is true if you like to pop your machine into the air. Don't expect the system to hold the tail locked on during gently ascents. You should set the system so that it fills the need for the way you fly most often, and leave it at that.

Now let's get to the actual set-up for most systems. First, we are assuming that you have a collective pitch machine with clockwise rotation for the main rotor. We will not cover the set-up for fixed pitch helicopters here, and if you have a counterclockwise rotor rotation, simply make each of the adjustments the reverse of the ones suggested, (i.e.; if the nose goes to the left increasing the up gain, you would *decrease* the up gain with a counterclockwise rotor rotation).

For practically all systems, there will be a switch which turns the system on and determines its direction of operation. The switch is normally marked L-OFF-R. We will need to determine in which direction to move the switch before we can proceed. Turn your radio system on and move the tail rotor stick to the right. Watch the tail rotor blades to see which direction they move for a right turn. Now, turn the ATS switch to the "R" position and adjust the up gain knob to full high. Watch the tail rotor blades as you move the throttle stick from low to high. If the tail blades move in the direction for a right turn, you are set. If the tail rotor blades move for a left turn, move the switch to the "L" position. Re-check the system to be sure the tail blades are giving a right turn when the throttle is opened. (Remember, counterclockwise rotor is the reverse of this.) Make a note of the correct switch position and move the switch back to the off position temporarily.

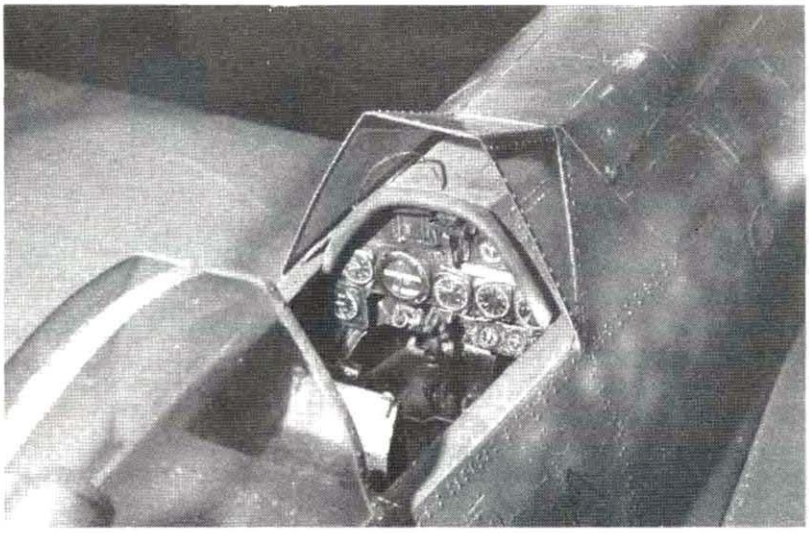
Prepare your helicopter for flight and put it into a hover to determine if the tail rotor trim is adjusted as near perfect as possible. If you are not hovering yet, gently lift the machine off the ground one foot and set it back down again. Try to notice if the tail rotor will hold the ship straight into the wind for the brief moment between the climb and the descent. Repeat this until you are reasonably sure the trim is close. Be sure that your gyrosensor (if you have one) is turned off, and only be concerned with the trim for the tail rotor at hover. Now, land the helicopter and turn the ATS system switch to the correct position and set the up and down gain knobs to full low (i.e. #0, or full counterclockwise). Check the acceleration mix to be sure that it is turned off completely for now. Gently lift the helicopter into a slow ascent and watch the nose of the helicopter as it climbs. Repeat this several times to be sure you have an accurate reading.

A few things can happen here. If your helicopter is light and has good power, the nose will try to turn to the left at a fairly constant rate. If your helicopter is heavy or the engine is tired, the nose will want to go sharply to the left at first, and then taper off to a gentle left turn. This method for setting the ATS will somewhat contradict your instruction manual. Most manuals will have the gains set to the 50 percent position for trial flights. I feel that it is important to know exactly what characteristics are present before trying to correct them. Although this method may require a little more time to set up, it should be more accurate overall. NEXT MONTH... ACTUAL ADJUSTMENTS ■

Sporty Scale Techniqu

by RICH URAVITCH

Cockpits... Decorating the front office

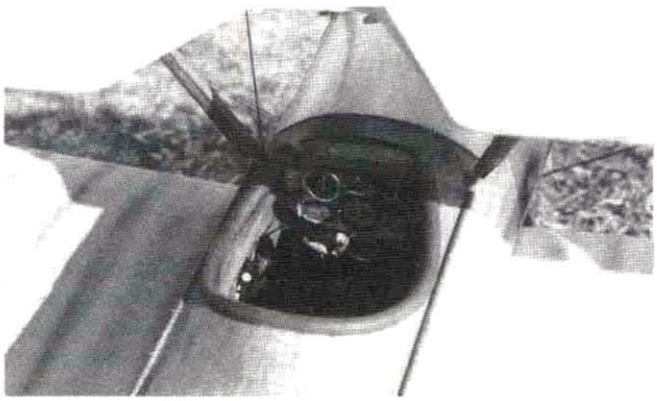


Jerry Puleo's Pica FW-190D shows what can be done with a typical military cockpit.

LET'S TALK ABOUT one area of sport scale modeling that seems to intimidate newcomers, striking terror into their hearts—building the cockpit! Strange, too, since it's one of the least traumatic undertakings. The "front office," the very place our minuscule pilot spends his working hours, may appear to be visually complicated but, broken down to its constituent parts, is readily duplicated. All those knobs, gauges and "black boxes" stuffed into a few cubic inches. One of the nice things about cockpit work is that it can be performed separately, away from the airframe. When completed, the entire sub-assembly is installed in the fuselase. Kind of a model within a model!

I can already hear the question: "Cockpits aren't required for Sport Scale can't be seen outside a 15-foot circle, so why bother?" First reasons, are fun and satisfaction; the second beckons you to wake up and smell the coffee...take a look at what's happening in Sport Scale!! Cockpits may not be officially scored, but being without one makes your model like a Dolly Parton blow-up doll....terrific exterior but nothing inside. I expect the judge's reaction would be similar..."I'm not supposed to care, but *something's* missing!" Until contestants are *downgraded* for having cockpits in their entries (which is neither likely nor desirable), the fully-outfitted office will continue to be the norm.

The technique for sport scale or precision (you remember *that* category, don't you) scale is similar; only the requirements differ. Loose on one hand, quite exacting on the other. For both cat-



Sopwith Pup is precision scale and includes tape-wrapped control stick ALA original.

es

egories there are basic ingredients.

DOCUMENTATION: This is one of the key elements in the successful execution of a cockpit. Pictures and drawings, as many as possible, should be studied from all angles. When you've studied so much that your bleary eyes make that drag chute handle or parking brake release look like a T-pin, prop and mixture controls resemble bead-headed straight pins, and the control stick appears to be that leftover piece of aluminum tubing, you're getting the idea!

SCRAP MATERIALS: Balsa, styrene sheet, lightweight card stock, solder, old plastic kits, tubing, wire, dowel—nearly everything you once discarded has *some* application.

PAINTING AND FINISHING MATERIALS: I use paint formulated for plastic models. It has a number of distinct advantages over other types since it's quick-drying, packaged in small quantities, has excellent one-coat coverage, and most importantly, is available in very accurate colors (builders of plastic scale models are even more fanatical than we are). Fuel-proof qualities are really not that important as most cockpits are rarely exposed to raw fuel.

ATTITUDE: This is *the* most important element and also the most elusive, since you can't run to your local hobby shop and buy it! You must *want* to attempt the production of a scale cockpit using a minimum of purchased material and a maximum of ingenuity.

INGREDIENTS: The cockpits shown here will give you an idea of what can be accomplished with a proper blending of the listed ingredients. Study the pictures... here are some of what went into them.

- Throttle levers: plastic rods heated with a hot knife to flatten the end.
- Aileron and elevator trim wheels: reshaped hub caps from a plastic car kit.
- Prop and mixture controls: bead-headed pins.
- Parking brake: T-pin.
- Electrical harnesses/hydraulic lines: various gauge solder, painted.

Pica Waco shows simple but effective use of plastic stock to create accurate panel. Accuracy of instrument type and placement is important.

Civilian subjects like this Yankee lend themselves well to full cockpit treatment.

- Seat harnesses: flat shoelace.
- Instrument faces: photostatically-reduced pictures or line drawings.

Among the models pictured are WWI, WWII, "Golden Age," and contemporary general aviation. Each is unique in execution, but the general technique is Scale model amongst them, and all the rest are competitive sport scale models.

I hope I've caught you in the middle of a project wondering if you should give a cockpit a try. Spend some time collecting your reference material, and start developing a feel for the various shapes you see. Remember, there's no magic or wizardry involved and it's well within your capabilities as a scale modeler. ■

Floating Around

by JOHN SULLIVAN

Gary Gleffe holds while George Graff fires up the Seagull's K&B .61.

WINTER IS HERE, and for many of you that means frozen lakes and warm shops where that new floatplane is waiting. This is a good time to reflect on an aspect of float flying that is too often ignored: the fun you can have *before* taking off. Many of us are using our water-based flying sites as just another means to get in the air and fly. This is a shame because there's a great deal of enjoyment to be had by learning the fine art of taxiing a seaplane. One of the great benefits of float flying to the rank beginner is the ability to taxi around at displacement speeds in order to become familiar with the plane's controls. If you don't exceed your abilities—don't go full throttle 5 feet off shore—it's possible to become comfortable with all four of your craft's basic functions while still on the water. Many newcomers are delighted to find they even have aileron control while step-planing. This approach to learning can even be experienced using a high-performance float plane if you agree to be conservative. It's like having training wheels on your Black Shadow cafe racer.

George Graff's Seagull glides by. Eight pounds with flaps. Scratch-built floats and internal rudder cables.

Bare-bones shot of Seagull reveals excellent workmanship on custom built-up floats.

The first order of business for the beginner or the accomplished float flyer is to have a reliable and effective water rudder setup on your floatplane. There's nothing more frustrating than being blown off course or up on shore just because your rudder system won't do its job. Here are some basic water rudder areas for various sized floatplanes. The numbers shown are for *one* rudder in a two-rudder system mounted on the float's sterns:

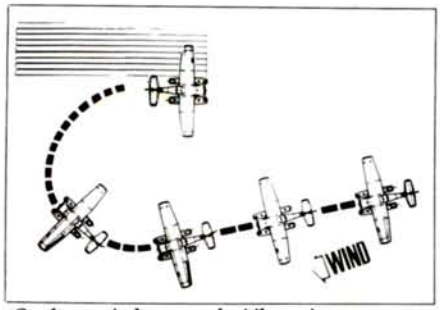
.20 size... 1.25 square inches
.40 size... 2.25 square inches
.60 size... 3.25 square inches
.90 size... 4.00 square inches
1.20 size... 4.50 square inches

If you elect to go with one stern rudder, use at least the next size up, and for one that drops down from the air rudder, use one water rudder matching the engine size.

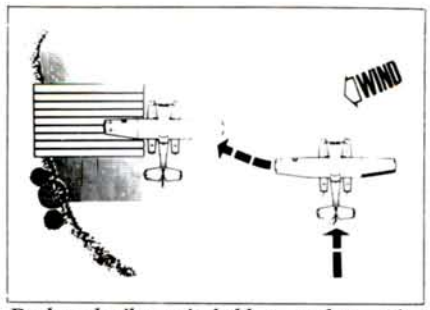
I usually set up my water rudders to swing 5 degrees beyond the air rudder throw. I also mount the rudders on the float stern allowing a minimum of 3/8-inch clearance between the bottom of the rudder and the water when the plane is on step. The water rudder throw may look excessive, but the faster you go the less effective it becomes, and the above setup usually achieves the proper balance.

In full scale floatplane applications there are three positions, or attitudes, which the floats go through from start to takeoff: displacement, hump and step. The water rudders are retracted at the start of the run, and full up elevator is applied, along with full power, to get the floats on the hump and the prop out of the spray as fast as possible. On the average plane the floats will rise at the bow and stabilize, at which point the pilot lets the stick ride forward until the floats are planing and the stick is at neutral. Thereafter, slight back pressure results in lift-off.

On a properly set up model floatplane, I've never seen the need to even touch elevator until takeoff. The extra flotation of the bow automatically brings the plane up to the hump, and increased throttle raises the horizontal stab and puts the float on step. All that's really necessary is to stay on rudder at the beginning of your runs (usually to fight torque), and then ease off until you're running straight into the wind. Elevator can be used to great advantage for low-speed maneuvers by



Onshore wind approach. Aileron is cross-controlled to keep wind under outboard wing. Example shows right-hand turn using right rudder and left aileron.



Darkened aileron is held up to keep wing level. Hold enough rpm to prevent backdrift.

keeping the float sterns buried, and can also be used to abort a run with full up and hard right or left.

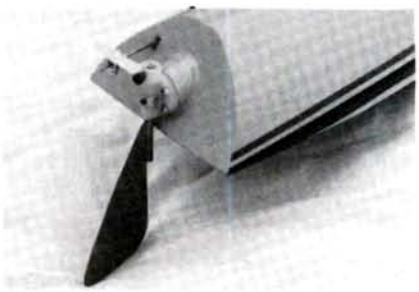
It is really important to understand that operating a floatplane is an almost perfect interface between ground-based taxiing and actual flying because the plane will react to wind conditions to a lesser degree while still on the water. There's something there for everyone. The beginner can go out and blunder around with no harm to his ego or his plane, and the expert can see how close he can come to the shore in a screaming, sliding, high-speed step run.

I've included a couple of photos in this month's gallery which are taken from the EDO manual. The shots illustrate how ailerons can be usd to keep the wings level in docking approaches. Study them during a break this winter, and in spring you'll have something to try with your floatplane.

This month's other photos reinforce a pet theory of mine that there's nothing prettier in all of model aviation than a well-done floatplane. This fine example was scratchbuilt by George Graff from a set of plans by Martin Fallandy. Martin named the plane "Gull Wing," and when George added the floats, he renamed it "Seagull." The plane and floats are all built-up construction. George went to a lot of trouble to keep the exterior as uncluttered as possible; for example, the rear float struts are faired aluminum tube with music wire reinforcement and flexible water rudder control cable epoxied inside. The top of each strut is held captive with collars inside the fuselage and the bottoms are held captive in the float deck by waterproof hatch covers. The Gull Wing section lifts off for equipment access. I took a picture of the interior but there's such a jumble of bellcranks, servos, cables and the like that it's hard to discern what does what even with George's help.

The Seagull's first flight was somewhat uneventful, with the usual clicks of trim, a dead-stick landing, and a ride in the rowboat. The second flight was more exciting because of a 1½-inch stranded cable which stretches from shore to shore at the far end of our lake.

After returning to shore, George refueled, enriched the mixture and took off again. The Seagull is really pretty in the air, especially in high-speed low passes, and possesses solid aerobatic capabilities. With no power-on landing experience owing to the first dead stick landing, George elected to try a long, sort of hot, approach and turned on final beyond the cable. Everyone saw the fatal encounter coming, inlcuding George, but we all thought, "Well, things like that just don't happen to a nice guy who has spent so much time on such a beautiful plane,



Neat, functional rudder set-up features modified nose gear bearing with stranded cable exiting stern.

right?" The Seagull smacked the cable, stopped in midair, dropped its nose with the wings level (excellent stall characteristic) and plunged into the lake. After retrieving the plane we discovered the float bottoms had been ripped up when passing over the cable, but the plane had sustained little damage otherwise. George had a good laugh with the rest of us about model aviation's ups and downs and then went home and smashed all the furniture in his house! I'm happy to report that George has recovered nicely as evidenced by the great job he did on this month's KittiWake review. All that remains is to convince him to put that gorgeous floatplane back in commission—and soon. ■

Top Flite Models

KITTIWAKE

Left: placid setting for review model belies its spirited performance.

John and George preparing the Kittiwake for its maiden voyage.

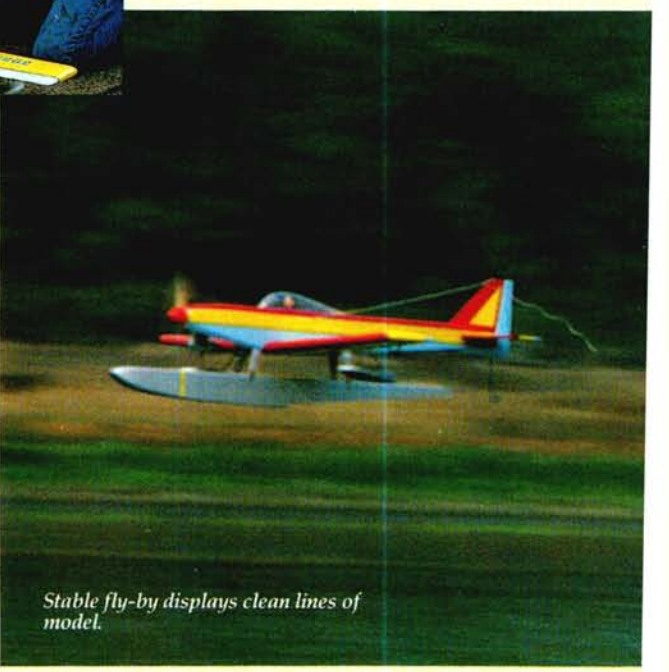
by JOHN SULLIVAN and GEORGE GRAFF

.25 powered, brisk performing, aquatic hot rod.

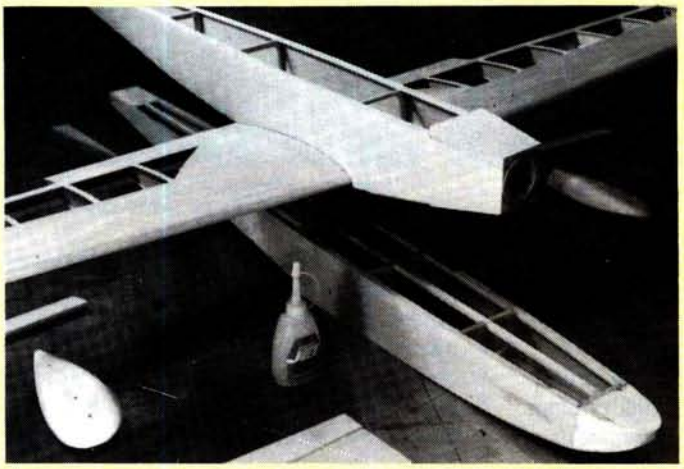
ONE OF the most exciting activities available to the sport flyer is the option to build little planes that go like heck. Small planes are also an extension of the "less-is-more" principle where the plane and the field box fit in the back seat of your compact, and you can usually have two exhilarating flights before the guy next to you has his 8-foot, 29-pound, biplane rigged and fueled.

A vest-pocket bomb... surpassing much larger equipment.

Type: *Intermediate Sport Seaplane*
Power: *.25 to .30 two-stroke*
Span: *47⅜*
Wing Loading: *24 ounces/square foot at 3½ pounds*
Weight: *3 to 3½ pounds*
Channels Required: *4*
Suggested Retail Price: *$89.95*
Features: *All-balsa construction, single-pylon float with wing-mounted tip units.*



Stable fly-by displays clean lines of model.

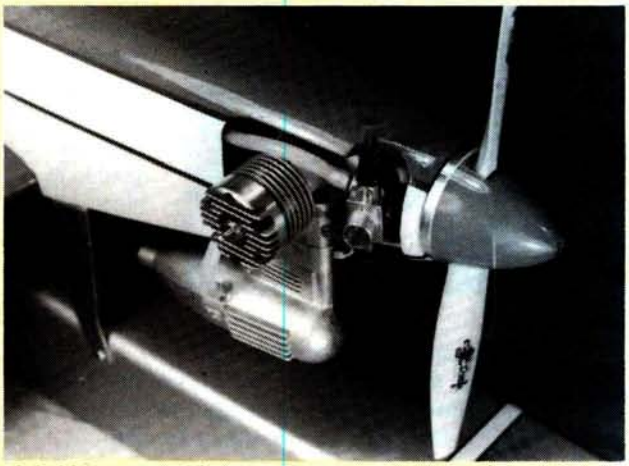


Basic assemblies blocked up for "first look."

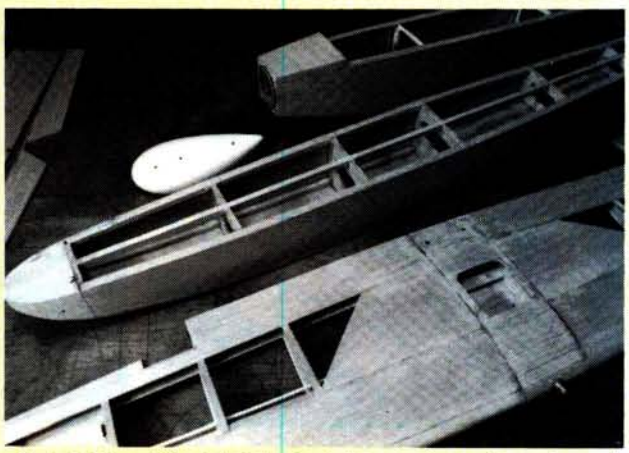
Top Flite's* new KittiWake is *that* kind of plane with an added and delightful advantage—it does it all off your local pond. The KittiWake was designed by Ken Willard and Scott Christensen with a real emphasis on performance. As a result, Top Flite notes in their instruction manual that this plane is not recommended as a *first* R/C-powered aircraft. There are three areas of concern that, I feel, influenced Top Flite in making this recommendation: the KittiWake is very fast and capable of pattern performance; it's small, with interior quarters similar to a glider; and finally, its water handling, although straightforward, would be too much for a beginner.

M.A.N.'s test model was built by George Graff, an old flying buddy and a mainstay of our club since we took to the water. Top Flite's emphasis on performance has influenced the KittiWake's design. The plane is strong and light, and this is accomplished either by using light balsa in essentially simple-to-construct structures with a low parts count (i.e., fuselage, empennage and pylon float) or strong balsa and a moderate parts count where strength is essential, as in a component like the wing, which has to stay light yet take pattern-performance flight loads plus stress from the tip floats.

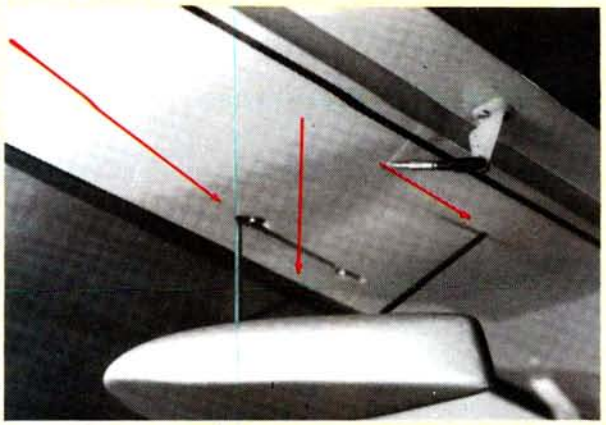
The wing is a double-tapered symmetrical airfoil structure with a D-tube leading edge configuration and built-up trailing edge. The ribs are provided with tabs which are cut off after the wing is framed up and the top sheeted. This enables the builder to construct the wing on a flat surface and assure accurate alignment. The barn door ailerons are cut out of the trailing edge after sheeting, at which point the aileron ribs and facing strips are installed. The ailerons are actuated by a single pickup point off the servo wheel which runs a continuous stranded cable. George trapped the cable at the servo with wheel collars. This is a



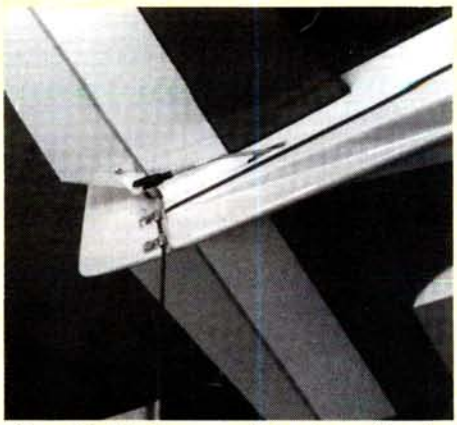
O.S. 28F power with 9 x 6 Zinger prop. See text for cowl ring installation tip.



Note lightened float bulkheads, built-up wing trailing edge and aileron servo cut-out.



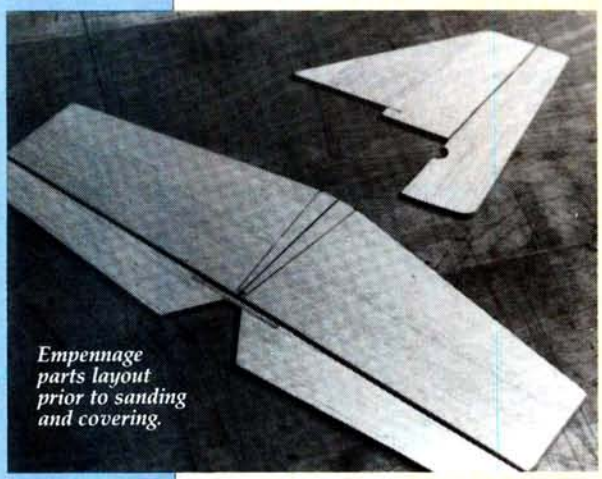
Three-point tip float support and aileron horn.



Completed tail group with water rudder installed. Note sub-fin for better yaw stability.

neat arrangement which eliminates bellcranks and works well in a situation where you don't need differential throw.

The empennage winds up being solid sheet construction after a minor exercise in parts arrangement which should increase your spatial perceptions immeasurably. The trailing edges are sanded to a taper, and worth the time it takes, as this adds a lot to the tailgroup's appearance. Also, be sure to set your control surface throws to Top Flite's recommendations or you'll end up with a plane that's too frisky.

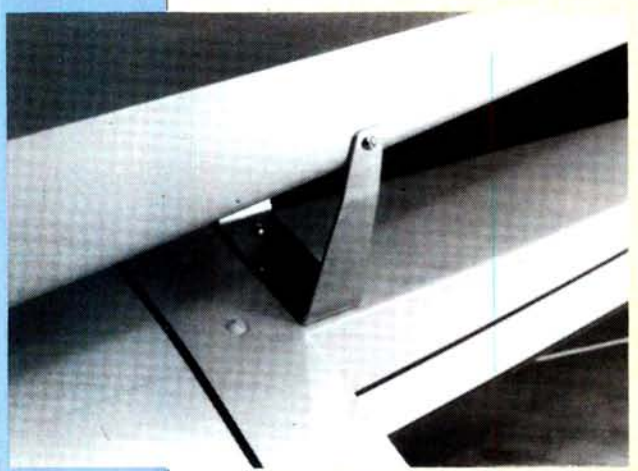


Empennage parts layout prior to sanding and covering.

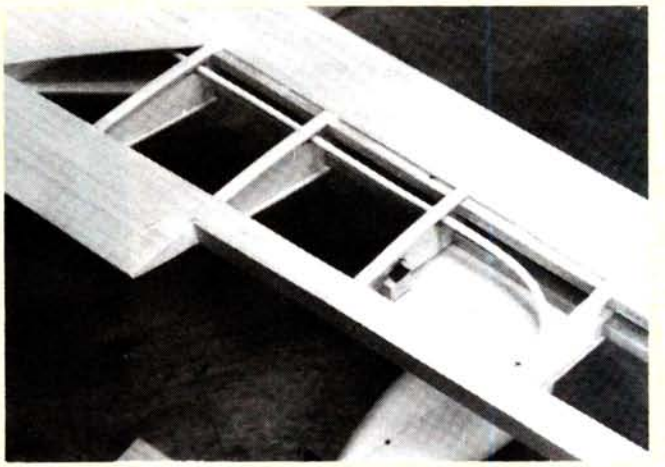
The fuselage and pylon float are both constructed from sheet material, reinforced with bulkheads and tri-stock, and then sanded to a pleasing shape after assembly. I must admit I tried to coerce George into changing the plumb sides on the float to a slope-sided affair, but he insisted on building the plane to spec, and it was fortunate he did because the flotation is right on. Top Flite provides aluminum blanks for the float gear, which appear to be too soft prior to installation, but once everything is screwed together you'll see the material is adequate. An added advantage is that if you dork the gear you can straighten it at the lake rather than putting it in a vise at your shop.

In all, George spent about 40 hours over a three-week period getting the KittiWake ready for covering. As stated, the kit was built to spec with the exception of weight-reducing holes which George cut in the float bulkheads to compensate for the added weight of epoxy-glassing the float. The one fault we could find was that the fuselage and float bulkheads were out of square, and needed to be trimmed to fit.

(Continued on page 110)



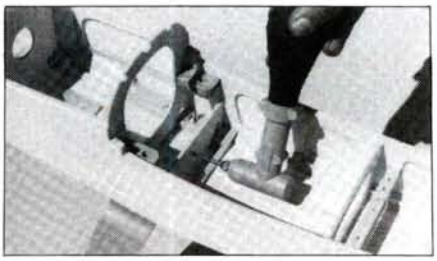
Aft aluminum float gear, nylon wing hold down bolts.



Aileron pushrod conduit and aft tip float mount hardpoint. Sturdy structure.

RIGHT ANGLE DRIVE

by CHRIS ABATE



"Where angels fear to tread"... hard-to-reach places are no longer a problem.

Model 420BB with carbide ball-cutter fits earlier style tools.

Model 421 for newer series Moto-tools. Note differences from 420.

Have you ever painted yourself into a corner? I have, many times. How about when completing a fuselage, starting to install the radio gear, and discovering you have to grind out a hole here or a slot there, and we all know there's no easy way to accomplish this! Usually, we end up with a screwdriver, X-Acto, fingernail file, 16-penny nail or anything we can get our hands on to try and make this surgic .

A VERY HANDY ADDITION TO YOUR TOOL ARRAY

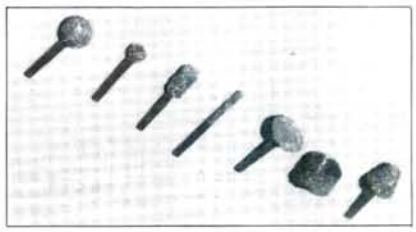
cut, and usually it comes out looking like we've blasted with dynamite! There have even been a few times when I've cracked the bulkhead or managed to put the tool through the top of the airplane. Well, if you're like me, you want the inside of your project to look as good as the outside. Relax—the people at Robart* have done it again. Their Right Angle Drive will allow you to go where no man has gone before. The unit will attach to any Dremel* Moto-Tool®, and also certain Craftsman® and True Value Master Mechanic® rotary tools. You can now drill, grind, polish, etc. in places that are tight around corners or just not easily accessible.

Two models are available, both having rugged ABS construction along with hardened powder metal gears, centerless ground shafts and lifetime lubricated ball bearings. This makes them durable tools. Model #420BB is for all Dremel Moto-Tools except the Dremel 395, 285 and 275 series which use the model 421 right angle drive. (A note of caution at this time. Included with the model 420 is a warning notice not to run the unit for more than 3 to 5 minutes at a time. This is due to the excessive RPM's of some of the tools making the bronze bearings overheat.)

Either model will easily clamp onto your existing Moto-Tool and by tightening a couple of screws, your're in. Remember to follow the instructions on the back of the package.

The top of the Right Angle Drive measures approximately 3½ inches with a cutting tool inserted. This allows you to get between bulkheads or reach openings where there's not much room. Can you imagine getting a full-size drill into a space 3½ inches wide? Good luck!

Another very useful item from Robart is their Rough 'N 'Tough Carbide Cutters. These little beauties will quickly grind through and remove wood, plastic and fiberglass, and are offered in seven shapes,



Rough 'N' Tough carbide cutters compliment right-angle drive usage. Available in coarse or fine surface.

all available with coarse or fine cutting surfaces which provide rapid and accurate removal of material without heat build-up. They are truly the perfect accessory to your Right Angle Drive Unit. I find both the Right Angle Drive and Carbide Cutters very necessary in the workshop.

**The following are the addresses of the companies mentioned in this article:*

Robart Manufacturing, 310 N. 5th Street, Charles, IL 60174.

Dremel, Division of Emerson Electric, 4915 21st St., Racine, WI 53406. ■

WRAM SHOW '88

SAME LOCATION AS LAST YEAR! YONKERS RACEWAY

For 1988 we will once again present our RC Plane, Car and Boat Show at the Yonkers Raceway — with unlimited parking. It's our 20th annual show and it's sure to be the biggest ever!

This year's WRAM Show is going to be the largest yet. Well over 150 manufacturers and other exhibitors have already signed up to bring you everything that's new in the hobby . . . kits, engines, radios, accessories and everything in between. And, our famous Swap Shop will be in full operation with thousands of items, including built-up planes, cars, boats and almost new radios, engines — something for just about everyone.

ADVANCED TICKET SALES

Save time, order your tickets now — send check or money order made payable to WRAM, Inc. (allow 3 weeks for check clearance) and self-addressed stamped envelope to:
Ed Alexis, 21 Pamela Road, Peekskill, N.Y. 10566

One day Ticket — $5.00
Two day Ticket — $8.00
under 12 yrs. — $1.00 each day

STATIC COMPETITION

All models must be operable and RC controlled.

Trophies and/or prizes to be awarded. VCR's to be awarded in two categories: "Best-in-Show" flying and "Best-in-Show" non-flying. Top of the line RC Systems for 1st place in each category. Trophies for all other winners.

- WWI
- POST WWI (Military)
- POST WWI (Non-Military)
- PATTERN
- GIANT SCALE*
- OLD TIMERS
- JUNIOR EVENTS
- SPORT
- GLIDERS
- HELICOPTERS
- SCALE RC BOATS, (Military)
- SCALE RC BOATS, (Non-Military)
- RACING R/C BOATS
- STAND-OFF SCALE
- RC CARS 1/12" scale
- RC CARS 1/10" scale
- RC CARS 1/8" scale and larger
- BEST-IN-SHOW

*Entries may be limited due to space availability.

To obtain pre-registration Static Competition forms, write: (include self-addressed stamped envelope) Allen Reinhardt, 2 Douglas Drive, Pleasantville, N.Y. 10570

Judging takes place Sunday afternoon.

Entries accepted until 12 Noon Sunday.

Special admission area will be provided on both days for static display contestants with built-up models.

Registration of models will start at 8:30 a.m. each morning.

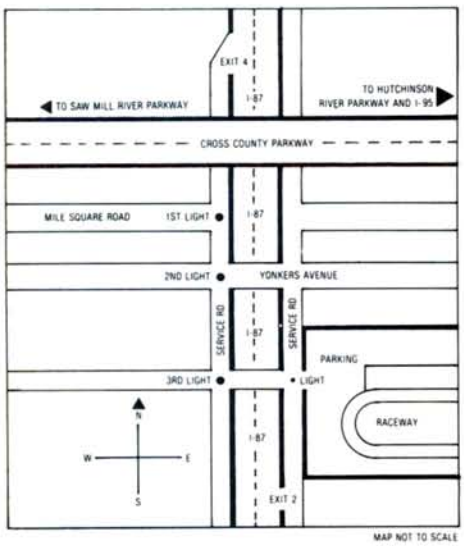
SWAP SHOP

The WRAM's Swap Shop has become one of the major show attractions with thousands of individual items changing hands. To help eliminate "registration crush," the Swap Shop will provide for preregistration forms. To receive these forms send a self-addressed stamped envelope to: John Isbister, 4 Devon Rd., Larchmont, N.Y. 10538.

SPECIAL NOTE

This year there will be no restrictions in the number of built-up models a registrant may place in the Swap Shop.

For further information, write (enclose self-addressed, stamped envelope) or call: Jerry Judge, 1 Nancy Road, Brewster, N.Y. 10509, 914-279-2717.



MAP NOT TO SCALE

DIRECTIONS

The Yonkers Raceway is located in Southern Westchester County along the Eastern or Northbound side of the New York State Thruway. (I-87)

FROM THE NORTH:
I-87 South to Exit 4. Service road to 3rd traffic light. Turn left (over Thruway) to enter parking area.

FROM THE SOUTH:
I-87 North to Exit 2. At 1st traffic light turn right to enter parking area.

WESTCHESTER RADIO AEROMODELERS, INC.

February 27/28

10 A.M. to 6 P.M.

Giant Steps

by DICK PHILLIPS

I'M OFTEN ASKED by other modelers of large-scale aircraft if there is a particular model available in plan form from 1/5 to 1/3 scale. While my own collection covers a large number of such plans, I don't have them all and there are some airplanes which have not yet been designed in the larger sizes.

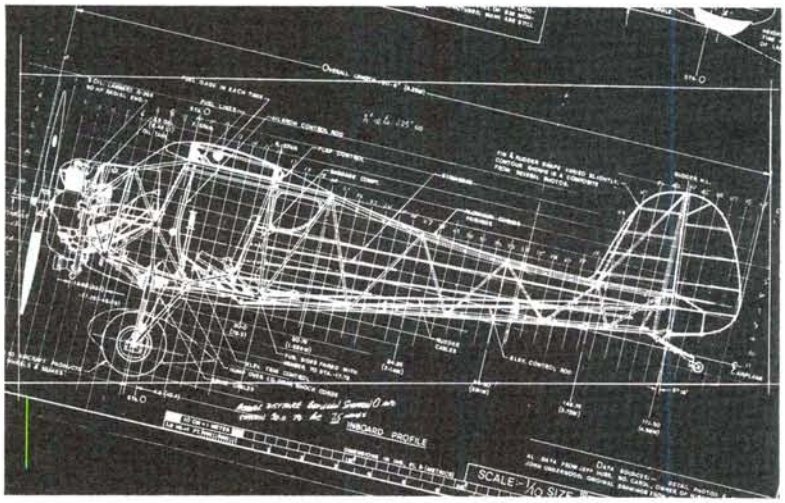
My response to such queries, where no plan exists, is that there are a number of alternatives. For example, a plan for the appropriate airplane in a smaller scale (if one exists) can be enlarged to the desired size. There are several ways to do this sort of thing and the method chosen is usually governed by the skill of the potential builder.

A modeler experienced at the drafting table can use a smaller scale plan as a basis for drawing up a plan to the desired scale. Such items as proportional dividers, appropriate scale rulers and so on will allow for enlarging the plan to the desired size. It's a good deal of work and effort and the results reflect the skill, dedication and care of the person doing the work.

There is another way to do this enlarging—with a photographic process. This can be done by the modeler himself if he has the equipment, skill, and knowledge to do it. Alternatively, it can be done by one of the commercial firms specializing in such work, substituting dollars for time and effort.

There are a number of firms that specialize in the *accurate* enlargement of such material. The operative word of course, is *accurate*. I have dealt with one of these firms on the Monocoupe 90A and have a print they made for me of the fuselage outboard view. They also supplied me with the negative they produced. This would permit me to have this view printed to any scale I wish. It is a relatively simple matter to take any measurement shown on the plan and determine what that distance should be in the scale desired. The print made from the negative is then adjusted to provide that distance accurately in the finished print. This is work easily done by the commercial firms that specialize in this sort of reproduction.

Drafting table. Size needs to be large enough to accommodate the appropriate width of drawing. Good lighting is imperative.



Negative for Monocoupe 90A, which can produce the Coupe outboard view in any size desired.

In using either of these methods, there are some pitfalls. For one thing, the modeler is stuck with whatever the accuracy to scale of the original drawing. If it was off scale, these will be even more obvious in the enlarged version than they were in the plan from which the larger drawing was made. Generally, some "fudging" will be required in the actual construction stages to accommodate small inaccuracies which will crop up in a straight enlargement of a smaller plan. (This was called the 4 Fs in full-scale construction. Factory Floor Fudge Factor) To some, such deviations from scale are not acceptable. They must do their own plan.

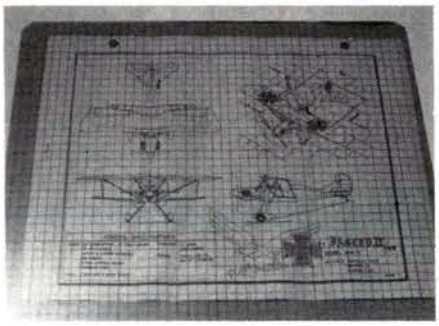
A varied set of French curves is a necessity. Irregularly shaped object is flexible curve which can be set to accommodate almost any curve and will maintain that curve until changed.

Be careful about having plans (or parts of them) enlarged with photocopying machines. Many of these machines will alter the dimensions slightly. Not only that, but some of them will alter the dimensions more in one direction than another. For example, the enlargement might be 150 percent across the plan, and 154 percent along the plan. Now that kind of distortion you really don't need!

Making one's own plan is also a large job and one which will require great care and attention to detail for successful completion. This work does not start with laying out a new piece of Mylar on the drawing table. It rightly begins with gathering detail from which to work. Not only detail from which to produce the plan, but detail from which to accurately finish the model to be built. Too often a builder starts looking for documentation after the model has been built. This is work which must be *completed* prior to even starting on the plan.

Most of us who have been around the modeling scene for any length of time have a collection of material for "someday" airplanes. Models which we promise ourselves that someday we're going to build as a superb, even museum scale model, and it's going to be perfect in every detail. At least that's what we tell ourselves.

If such a collection of material is in hand, much of the "collecting" has already been done. If not, then it's time to start writing letters and ordering material from which to work. *MAN* and other model magazines have collections of documentation material which will provide a good solid basis from which to design a model. In this series of articles, I'll be using the Peter Westburg drawings of the Monocoupe 90A as the basis for a 1/3-scale plan of the 'Coupe. *Of Men and Monocoupes* is also a book in my library and, although there are no color plates included, I have some photos of a variety of Monocoupes from which to work. I have been privileged to meet Fred "Monocoupe" Ludke, who owned and flew a 'Coupe which was quite unusual in that it had a 90 wing and a 90A fuselage. Fred is currently in the throes of restoring a 110 Special, although what he is having to do comes a lot closer to building than restoring.



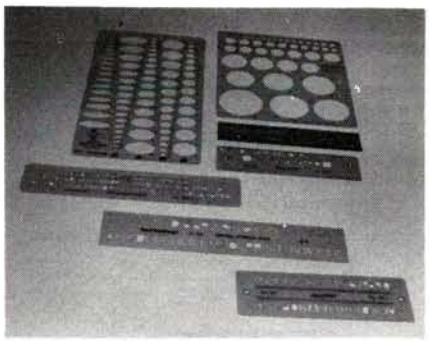
Placing pre-drawn grid over three-view or any other drawing permits enlarging to any desired size by choosing an appropriately sized graph drawn on a new mylar surface. Most useful in enlarging smaller parts from a pan (i.e. wheel pants etc.).

People like Fred (and there are others) have a wealth of data on their special airplanes and I have found them to be willing to share this material with the modeler. There are many other sources of material on a wide variety of airplanes and I'll include a listing at the end of the last of this series. Such firms as Scale Model Research, Repla-tech and many others specialize in supplying us with three-views, books, photos, and drawings of literally thousands of airplanes. It would be a rare and esoteric airplane indeed that could not be located somewhere. For example, the National Air and Space Museum (NASM) has the original certification drawings submitted to what was then the ATC in order to get their airplane certified for flight. If you think about that for a minute, it should make you aware that any airplane which ever received a certification in the United States has a corresponding set of drawings in the hands of NASM. Copies of these drawings are available to everyone for a very modest fee.

While it's not possible to have too much information before starting, there will be times when a decision has to be made as to what you will use and what you'll either discard or ignore. Older airplanes, the Classic and Antiques, have been documented many times and there are any number of errors and inaccuracies which have been perpetuated by repeated publication. Many of these have come to be accepted as fact. In some cases, it isn't going to be easy to separate fact from fiction. There will be times when you'll have to take your best guess and use what you have in hand, weeding out conflicting details as you see fit. You'll usually be as safe as a house in that nobody really knows what existed several decades ago. Naturally, you'll use photos and contemporary material wherever possible and the photos will be your best bet. The camera never lies, does it?

(Continued on page 92)

Minimal set of good-quality drawing instruments.



Extras. Set of oval and circle templates are handy. Lettering guides are a must unless your freehand lettering is excellent.

An assortment of pencils is a must. Shown are two sizes of mechanical pencils, two nylon-point pens and a variety of leads for different purposes.

Golden Age of

by HAL "PAPPY" deBOLT

READER INPUT is an important part of the golden age of R/C. Remember, this is your old timer R/C place. Reader response has been extensive which shows you're interested and makes our effort worthwhile. We have seen a pattern form with the early exploits you tell us about (all interesting and appreciated), which indicates that most of us experienced similar beginnings. So even if you read a report in this column which echoes your own experiences, please continue to fill us in on your old timer R/C endeavors; your input is much more than a good story. Your letters are answered and filed; the whole of which is kept as a form of early R/C history.

How about a Golden Age flea market? Those of you searching for old timer R/C items may be interested in a couple of items offered below.

Steve Gibson of 11160 Jollyville Rd., #1326 in Austin, TX, checked in with a story on how his nearly 20-year interest in R/C led him to uncover some early equipment. He acquired a 5-channel system (reeds?) which he will use for old timer R/C. He also found another jewel: a brand-new, still-in-the-box Citizen-Ship single-channel system! His photo shows a model FL transmitter and a model MTK receiver, plus two escapements. Interested? If so, contact Steve for more details. It's for sale.

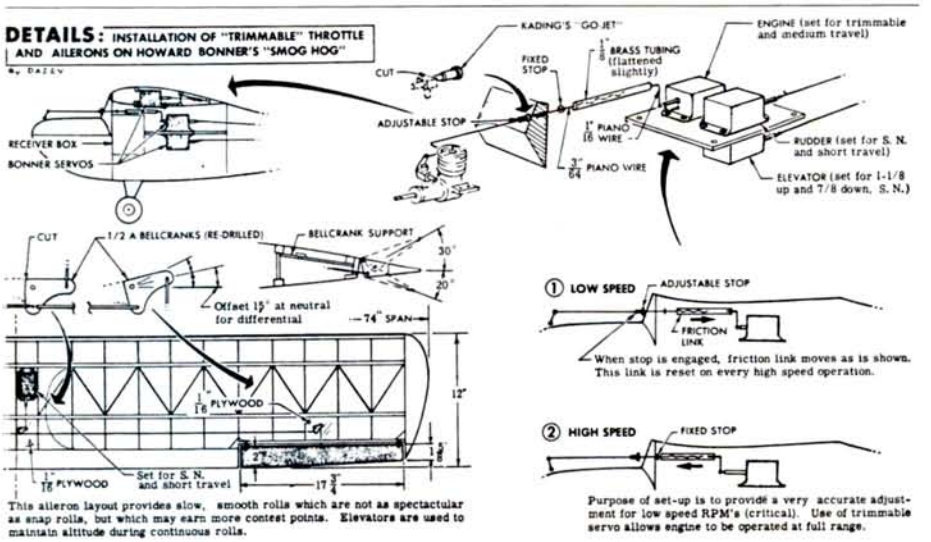
Shades of the Space Shuttle late '40s style. Super Buccaneer and an original design. In Brown and Forster-powered with ignition.

Interested in a rare, 1950's old timer R/C plane? If so then contact Eric Taylor, RD #1, Box 4276 in Lincoln, DE 19660. He has obtained an original model which he has refurbished to near original condition.

This particular plane was born out of an era where many of the established model manufacturers jumped on the bandwagon with some type of trainer design. Some kits were popular, others weren't and just slipped through the cracks. One of the lesser-known planes was designed by Art Hasselbach and kitted by his company (Consolidated Model Company) on Long Island. Art's plane, the "spirit," had an attractive design and incorporated a single-channel system. It had a wing span of about 52 inches and featured .15 power.

We continue to get requests for sources that carry old timer R/C plans. A recent example came from Lowell Hornbeck of Oberlin, OH. Like many of you, Lowell is searching for the "Over and Under," the first R/C design intended for inverted flight and maneuvers. We do not have a source for these original plans, however, a detailed article and plans for the "Over and Under" was published in the July 1954 issue of *Air Trails*. Demco did update the plane's design and kitted it as the Live Wire Sonic Cruiser, which is available from Fran Ptaskewitz, 23 Marlee Drive, Tonawanda, NY 14150.

Arthur Brock of McAllen, TX, wrote, reminding us of a clever single-channel



Last update of the Smog Hog added ailerons and precise engine control, by Howard Bonner. Used by Bob Dunham to win the '57 NATS.

actuator. Art tells of the first R/C flights in 1948 with an Aerotrol equipped Buccaneer powered with a Drone diesel. The Drone's ability to swing a large prop make them ideal for the first big R/C models. Later, overseas in Jordan, he flew with George Redlich, who was the engineer in the British "E.D." electronics company of the 50s. Naturally he used an E.D. system which worked well with the master's touch.

Art still has a single-channel actuator which was aptly named the Ruddervator; a simple gimmick which offered potential rudder and elevator control with a single-channel, devised and marketed by Herb Owbridge. Essentially, there was a control surface tab attached at an angle to a shaft at the aft end of the fuselage. The tab would "free wheel" in the propeller slip stream. An escapement-type electro magnet could extend a pin (on command) into the path of the spinning tab and stop it. Depending in which position it was stopped, you had the option of control action to the right or left or up and down. Obviously there was a sequence involved, so dexterity was the key to finding the control you wanted. It was very usable because the control action was mild, and if you missed a command, you could just try again.

The widely used Mighty Midget motor as arranged for a pulse-proportional servo. Homemade.

One of our club members gave the Ruddervator a try, but the results were not very encouraging. On final approach, he needed a rudder correction and got down-elevator when he least could afford it. Murphy's law fit the Ruddervator neatly. But even so, a considerable number of Ruddervators were sold; we all wanted multi-controls so desperately at the time!

Walt Good's first Multi-Bug proportional TTPW radio. Cradle was used for glider launching. See it in the AMA museum.

Another useful letter came from Marty Vagts of Valencia, CA. Marty is another old timer who started with a Berkeley 36-inch Cessna, powered by a Cox .049. He says the Cox pulled the Cessna almost straight up, so they limited the fuel supply and used R/C only in the glide. We sure found ways to fly in spite of the handicaps! He also built a L.W. Trainer and a Sterling Rudder Bird, both of which he did not fly until 1975 when he had a ball with them. He has over 30 years of great R/C!

Marty also helped us in answering a request for information. He supplied copies of the 1956 C-G Electronics catalog plus one for Citizen-Ship. Thanks, Marty!

Have you read James Mitchener's book *Space*? It's quite an accurate history of space beginning from its early days to planet explorations. But what caught my eye was the portion devoted to determining what the best methods were to enter space. Initially, several great minds contributed their opinions and ideas. This led to the involvement of a number of agencies and laboratories in the investigation of several proposed methods. Some suggested a super-sized rocket. Others thought a combination of smaller motors might be the answer. The final solution, though, was the staged module method, which put us on the moon.

Mitchener's discussion of this era reminded me of the early days of proportional R/C. Like the space people, we had a definite goal (the ultimate in R/C) and we did not know which method would work the best. Several approaches were proposed by different people, each yielding different possibilities for achieving proportional R/C. You would find these methods interesting, and as a result, have a better basic knowledge of why things are as they are today.

Historical data shows that three fundamental methods were developed and followed by different people. One would imagine that there were plenty of other concepts floating around out there as well. It was a great time of change where over a short period of time R/C cars were scrambling to keep up with the latest in technology, unlike today where the basic radio has remained the same for the last twenty years. It seems to me that before we had time to thoroughly understand one system, another (supposedly superior) system was in the offing.

Literally a 3-dimensional aerial collage...Old Timers on display at AMA Museum.

What was it about proportional R/C that made it so desirable? Before "propotime," all actuators moved a control from neutral to full deflection with your command. You also operated the controls singularly. With such systems, the model had to be adjusted to "fly itself," so to speak. You applied a control to change direction and then stopped con-

(Continued on page 88)

duke's mixture

Quite a number of model flyers are lost to the hobby on their first model because they do not get any consistent supervision and wind up smashing their play pretty and give up in disgust. Over the years I have had every one of my students become reasonably proficient on their first model.

First, explain to your potential model flyer that learning to fly a model airplane is learning an unnatural skill like flying a full size airplane, or riding a bicycle, or roller skating. This is further complicated by the fact that you have to correct from visual observation and not from your own body sensation. However, learning is not too difficult if we break it down piece by piece. First, say we are going to teach you to taxi, and I want you to get familiar enough operating your left hand (assuming two stick mode two) so that you don't have to think about that when the time comes that you need to concentrate on your right hand. Then you start him out taxiing around the field, parking lot, or whatever, with the wing off. Have him run it down the field, turn it around, bring it back, run it sideways, bring it toward him, and every which way, until he feels that he has it totally mastered. The reason for removing the wing is that you don't want him to get it up into the air and crash. When he gets so that he can run it straight down the runway, slow it down, turn it around, and bring it back at a good rate of speed, and keep it straight, then tell him that he is ready for a flying lesson. But first, get the airplane trimmed. Don't start a beginner on an airplane that is out of trim, or has any operational problems. Then explain to him that takeoffs and landings are the most difficult part of flying models, and that you want to reserve that until he has become reasonably comfortable with flying. Then the thing to do is explain that you are going to take the airplane off and show him how to do figures 8's, and that the reason for doing figure 8's is that nearly all model flying involves turns of some sort, and that to be able to make a left and a right hand turn comfortably, and to maintain altitude (neither climb or dive), is the basic maneuver that flying is built on. Explain that he wants to think of this in terms of riding a bicycle. The model turns in the direction that it is tilted. To make a turn, first think tilt the airplane left, then as the nose starts dropping, you correct with elevator, just enought to keep the airplane level. When the airplane has finished the turn, then you are going to level it with right aileron. Fly level for a little bit and then make a right hand turn, first tilting the airplane, letting the stick return to the detent, and then correcting with up elevator. Tell him that you want him to keep practicing these turns in figure 8 fashion until he can do it 20 feet above the ground without breaking out in a cold sweat. Now is the time that the instructor should make clear that there will be times when he gets disoriented, and he does not have the model under control. When this occurs, he should be conditioned to pull both sticks full back and yell "Help". This will cut the power and put the model in a series of tight loops, and give the instructor more time to get it back under control. Another reason for doing figure 8's is that many flyers find it more difficult to make a right turn than a left turn (including me), and if he makes only left hand turns when hs ie first learning, turn left is locked in his mind forever. You don't want that to happen. The reason that we want him to do figure 8's until he can make a turn 20 feet above the ground without panicking is so that he will learn to make his landings close in. He will have no problem getting on the runway if he learns to do a downwind 25 to 30 feet in the air, and make his left base and final close in. If you turn final at 15 feet altitude 50 feet from touchdown point, it is almost impossible to miss your landing spot very far.

Most beginners will have 3 or 4 different instructors coaching them through their first few flights. If all of the instructor type modelers at a field could be persuaded to follow more or less a standard pattern, then the confusion of having one instructor tell you one thing and another instructor tell you another, could be reduced. I would suggest that a standardized training pattern could be a subject to discuss at your next club meeting. Whether you follow my particular pattern or one you create, I think that it is important that all members of a club or flying field who take the responsiblities of an instructor should follow on an agreed instruction pattern so that when a newcomer wants to fly, he can be helped by whoever is there at the moment without conflict.

We have not yet replaced Ken, our now retired office man of 20 years. The ideal candidate would be a model builder and have experience managing a wholesale model operation. Pay — $22,000 - $25,000 range.

I am running out of subject to talk about. If you want more of this patter, give me direction, please. Thanks.

Duke Fox

FOX

Manufacturing Company
5305 Towson Avenue
Fort Smith, AR 72901
Phone (501) 646-1656

ROAD RUNNER

(Continued from page 26)

such. The big Rossi is another story. The solution for this one was to use a radial mount made from sheet aluminum alloy. The plate is attached to the engine with the rear cover bolts, then to the bulkhead using the established bolt pattern. A 3/32-inch plywood spacer is required behind the plate for bolt head clearance.

WING: Weight is an important factor for racing and aerobatics. The new rules allow a minimum of 3½ pounds which is extremely light considering the heavy engines used. With our recent electric-powered designs, a lightweight, very strong structure has developed. The same concept was used for the Road Runner making welcome savings in precious weight.

You can assemble the wing in your usual manner, of course. With this simple layout we strongly suggest that you try the saddle jig method for a new experience. The wing is assembled bottom side up. If you have a dihedral board it is even simpler and the wing comes off the board practically finished. Start the assembly by locating the saddle jigs. Then mark the rib locations on the top sheeting. Pin this sheeting in place in the jigs. Then locate and install the sheet spars and add the center joiners. All ribs and remaining structure are then added. The bottom sheeting finishes the structure except for the leading and trailing edges, which are simple once the wing is out of the jigs. The advantage of this method is that assembly is very quick without the constant attention normally given to alignment. Better yet, you're assured of a true wing by the jigs used. You'll like it!

STABILIZER: You might wonder why the built-up structure when solid sheet is commonly used. Frankly, with racing, we have often seen sheet stabs fracture. The built-up structure assures adequate strength, and it does go together quickly. Also, since ¼-sheet is expensive these days, you save on cost and even some weight.

FUSELAGE: What is there to know about a simple box? In this case the use of Lite Ply sides eliminates much of the normal internal structure, reducing parts to a minimum. Note the cute trick of extending the servo tray mounts through the sides, no reinforcement needed! Again refer to the structure photo which shows weight-reducing holes. Omit these for the Enya and Rossi engines with their extra weight. The top sheeting curvature takes

(Continued on page 72)

Slipping the surly bonds... Electrically!

by ART SCHROEDER

LEISURE ELECTRONICS

AMPTIQUE

THERE ARE NUMEROUS ways to enter this wonderful world of radio-control model airplanes. Trainers of every size, style and type leap off magazine advertising pages and compete for attention on dealers' shelves. All claim that they are the easiest entry point. "Build *me* and, in short order, you'll be a world class R/C flyer." But, as we all know, there are trainers and there are "trainers"! Some really do a fine job; that's obvious since our ranks are growing. But we need all kinds of trainers that are effective if R/Cing as a hobby/sport is to continue. What makes a decent trainer?

Some of the requirements seem contradictory. A trainer must be light in weight but strong. It must be easy to fly, giving plenty of time for a novice pilot to think, while being

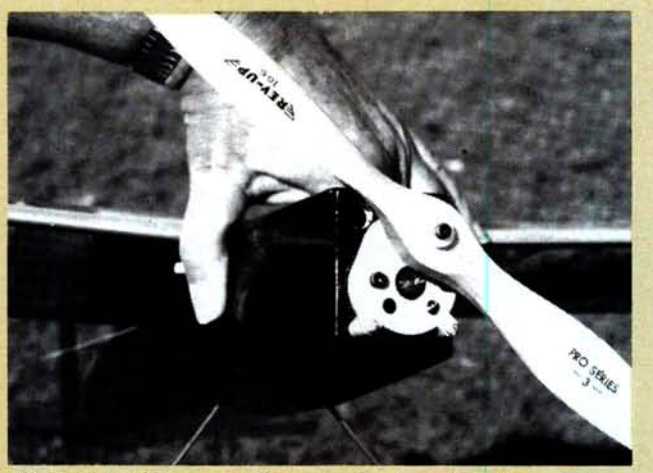
Art launches the Amptique on one of its frequent quiet, relaxing flights. Design combines the pleasant qualities of electric power and trainer.

Type: *Electric-powered trainer*
Power: *Leisure .05 with 2.5:1 reduction*
Span: *61 inches*
Wing Loading: *9 ounces/square foot*
Weight: *35 ounces*

Channels Required: *2 to 3*
Suggested Retail Price: *$39.95*
Features: *Lightweight balsa construction, conventional building techniques. Excellent slow flyer.*

maneuverable enough to get out of trouble when needed. A trainer must have an easily started power plant, one that can be counted on time after time, no matter what the flyer does. A trainer must be easy to build with no tricks in its construction, and it must be stable, able to right itself in most panic situations. It must, at least, look something like an airplane, and it must provide a satisfying building and flying experience to give the first-time flyer a reason to continue. Designing trainers is not an easy task! Dale H. Black took the trainer-designing task on for Leisure* and now we have another way for beginners to radio control. The new way is Amptique, an electric-powered airplane for the novice.

This latest effort by Leisure follows on their series of old-timer free flights for R/C. By themselves, the Leisure Playboy (we did that project a few years ago) and Lanzo Bomber are outstanding trainers. Amptique takes the genre a notch higher.



Motivational force comes from geared Leisure 05 motor swinging a 10x6 rev-up prop. 7-cell, 800 mAH pack used.

THE DESIGN: Dale Black obviously put a lot of thought into Amptique's configuration and structure. The fuselage is 1/16-inch sheet balsa slab side with 1/8-inch square balsa interior framing. There is some minor doubling at wing dowel and servo mount locations. Wing structure features two main 3/16-inch spars with shear webs, 1/16-inch ribs, a shaped leading and trailing edge and 1/8-inch square balsa stiffening braces to eliminate any tendency for wing warpage. Fin and stabilizer are simple built-up structures and both rudder and elevator are solid 3/16-inch balsa. There's not a superfluous piece in this design and I recommend that nothing be added since it's simply not needed. When one tries an electric airplane, weight becomes a primary consideration. Amptique is strong enough for any flight loads or ground shocks and, quite honestly, "light" crashes a lot better than "heavy" so don't modify this one. By the way, the parts fit is so good I recommend only thin CA for an adhesive. PIC Stic was used exclusively for all joints. CA glues add virtually no weight and create joints that are very solid. Epoxy is not needed to put Amptique together.

As far as design elements are concerned, Amptique carries a 12 percent, flat-bottom airfoil not unlike the Clark Y. At the angle the wing, stab and thrust line are flown, Amptique should exhibit stable flight with positive stability (a natural tendency to return to level, straight flight when controls are neutralized). This positive stability is enhanced by the polyhedral wing. With this much wing angle, Amptique will always try to right itself no matter how "ham-fisted" a novice might be. Just as surely, the big wing with 518 squares will offer soft flight qualities and nice thermal ability. Having built and flown Playboy, only 58 squares more and slightly heavier, I was certain Amptique would be an excellent flying bird. All in all, Amptique looked nearly ideal for R/C novices and subsequent flight tests proved that to be true. Indeed, the airplane is cut from the same bolt as many old-time free flights combined with a lot of modern R/C thinking.

THE KIT: Amptique is an all balsa, built-up, shoulder wing design with a polyhedral wing. All wood in the kit was purpose-selected, and no piece or part required replacement. Parts preparation was outstanding and they appear to have been cut with a fine band saw. Parts fit in all cases was perfect. The kit includes all necessary wood, most hardware, instructions and blue-line plans. To complete this airplane, glue, covering, wheels and power unit must be purchased.

CONSTRUCTION: Initially, I felt the written instructions were a bit skimpy and vague for an absolute, first-time builder. But, if one studies those instructions and the very clear plans, a logical building sequence emerges. Someone with no plan-reading experience of any kind will be faced with a challenge, and I recommend a counselling session with an experienced modeler. But, for the most part, Amptique is very easy to build. For anyone with a couple of models of any type under his belt, Amptique is a very simple project to complete.

To check this, I enlisted Jonathan Welsh, a relative newcomer to R/C, to construct the airframe. Jonathan has a number of rubber-powered models and gliders in his modeling background and one Quickie 500. He encountered no problems whatsoever, and in one week delivered a finished, sanded airplane.

The project Amptique was covered with transparent Solar Film that has been around my shop for years. While some of the newer plastic heat shrinks may be better, the Solar Film did a very satisfactory job. One thing is certain, sun shining through that transparent film is a beautiful thing to watch.

POWER SYSTEM: Leisure is quite specific on power recommendations. And they should be; the Leisure .05 stock motor with a 2.5:1 gear box, powered by a 7-cell, 800 mah battery does a fine job of hauling Amptique when coupled to a 10 x 6W Rev-up propeller. The unit, as

(Continued on page 104)

Type: *2-meter glider, power package optional*
Power: *Graupner-geared Jumbo 540*
Span: *2 meters (79.3 inches)*
Wing Loading: *13.5 ounces/square foot (powered)*
Weight: *56 ounces (with electric package)*
Channels Required: *2 (3 if electric-powered)*
Suggested Retail Price: *$69.90*
Features: *All-wood construction with extensive use of lightweight plywood in the fuselage.*

Hobby Lobby/Graupner

SILENTIUS 86

JUMBO 540 ELECTRIC MOTOR

Multi-purpose 2 meter machine which may also be non-powered.

by PETER YOUNG

THE GRAUPNER SILENTIUS 86 is a two-meter, radio-control glider available from Hobby Lobby*. For this review, the electric-power version was built, although a towhook-equipped, non-powered version is shown on the plans. Three-function control capability is required to operate rudder, elevator and motor speed by an electronic speed controller (or, alternately, motor "on-off" by a micro-switch). I ordered the following propulsion equipment for my Silentius: Graupner's Jumbo 540 geared motor connected to their 12-inch folding propeller, with motor speed control provided by the Miniblitz electronic speed controller. Hobby Lobby also markets a carry-on case designed specifically for the Silentius which sounds like the perfect accessory for vacations or business trips.

KIT: The Silentius arrived packaged in an attractive multi-color box. The kit's instructions are exceptionally thorough and very easy to follow. There are three large plan sheets providing comprehensive information on airframe construction, propulsion system installation, and flight trimming. The construction plan sheet

The author is shown here, needlessly pensive, prior to first flight. All went well.

Color photos by HANK WOODRUFF

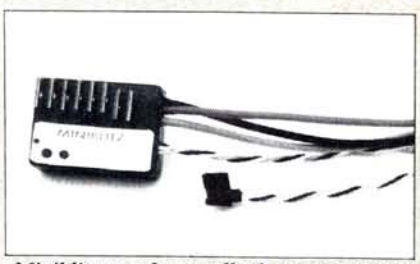
Left: The Silentius soaking up the sunshine after first flight.
Below: The author's son Brett making certain dad was careful.

is annotated in German, causing some initial apprehension; however, every note is numerically coded to a translation listed on an adjacent sheet. One interesting comment—written in all caps—was sternly translated as "SUBJECT TO CHANGE SERVING TECHNICAL PROGRESS!" Hmmm... perhaps something got lost in the translation?

The wing is a two-piece polyhedral configuration with pine main spars top and bottom, and pre-slotted leading and trailing edges. The airfoil is very close to an Eppler 205 with considerable upsweep to the leading edge (Phillips' entry). The wing spars are double shear-webbed for additional strength. This wing shouldn't ever fold if built to specs!!

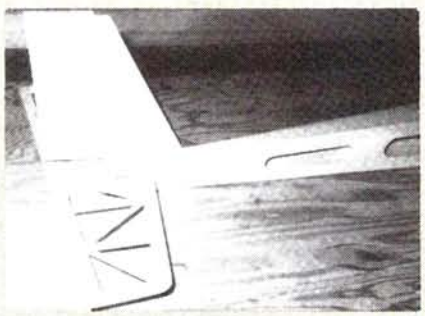
The fuselage is constructed almost entirely of a light plywood material with many large holes for weight reduction. The cabin volume is very generous and has a unique double-decker configuration to hold the motor batteries (up to 1200 mAh) in the lower section, and radio equipment in the upper. A trap door in the fuselage bottom allows access to the motor battery without having to remove the wing—very handy for replacing batteries at the flying field.

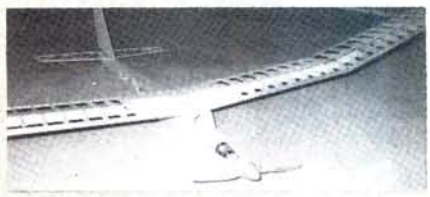
There are no surprises in the design of the horizontal and vertical tail surfaces. One nice feature of the vertical fin is that it extends down to the fuselage bottom surface and thus has plenty of structural margin from being knocked off inadvertently. In my experience airplane models receive the most damage when being moved through doorways or in and out of cars, but much less damage than from the actual flying. Is this a subset of Murphy's Law?



Miniblitz speed controller harnesses power to the 540 electric motor. Works well.

CONSTRUCTION: Using the detailed step-by-step illustrations with the comprehensive instructions, construction proceeded smoothly and uneventfully. Assembly is very straightforward, aided by 16 step-by-step illustrations for the sub-assembly construction. The only comment I would add concerns the installation of the double joiner wires into the wing root section. These wires are pre-bent at a slight angle so extra care should be taken when epoxying in the wing tubes to make sure that the main panels are properly aligned in sweep and dihedral angle. Any mismatches during this step will throw off the proper angles and make the wing panels difficult to assemble. If I had to do it over again, I would opt for straight wire sections to ease the alignment process using 3/16-inch wire for the front and 1/8-inch for the rear.





Left: Fuselage aft section and empennage. Above: Assembled airframe prior to covering with Goldberg Ultracote.

FINISHING: My Silentius was covered with Carl Goldberg's* new UltraCote covering material in red and white. This was my first opportunity to use UltraCote and I was very favorably impressed. Its handling characteristics seem to be midway between Econokote and Super Monokote and it was particularly good for covering sheeted areas.

EQUIPMENT INSTALLATION:

(Continued on page 78)

EAA INTERNATIONAL 1987 FLY-IN CHAMPION

SIMPLY THE BIGGEST AND BEST AVIATION

OSHKOSH

by RICHARD URAVITCH

Photos by Richard Uravitch

EVENT IN THE WORLD!

Vintage aircraft abound at Oshkosh; in proud field display and crowd-pleasing aerobatics.

ONE WOULD imagine that visiting a usually subdued, friendly Midwestern city to absorb all that's worth talking about in aviation year after year would get old. Not so, not by a long shot!! This year I took my *sixth* trip to Aero-Mecca and I still consider myself new at it. I've seen guys walking around with so many EAA Oshkosh "annual" patches on their jackets that you couldn't tell what color the jacket was! There are lots of reasons for returning: the AIRcraft enthusiasts, the AIR shows, and the AIRplanes! There are plenty of all these and to do it properly you need to plan on spending a minimum of three or four days, at least one of these being the Saturday or Sunday when the largest of the daily air shows takes place.

This year could easily be considered a celebrity-studded cavalcade with numerous well-known "stars" in attendance. Astronaut Bob "Hoot" Gibson, a ducted fan fan was on hand to present a special commemorative plaque to EAA president Paul Poberezny which will be displayed for all to see in the EAA museum. Dick Rutan and Jeana Yeager, along with Voyager designer

Oshkosh

A B-25 Mitchell on take-off roll.

Burt Rutan, were honored for their collective accomplishments focusing on their incredible unrefueled around-the-world flight. I never made it to the tech forums that they pre-sented—the crowds kept me from getting any closer than Illinois! Actor and EAA member Cliff Robertson, a long-time aviation enthusiast, was again on hand. This time his absolutely magnificent Mk IX Spitfire was orne with Jerry Billings "beating up the aerodrome" for the enjoyment of us all. The daily airshow had something for everyone including Bob Hoover in the Evergreen Shrike commander, Bob Bishop and Dave Hoover flying their twin Coors Light BD-5J's, the omnipresent Eagle Aerobatic team, Bob Herendeen in his S-1 Pitts, Steve Wolf in his ground-shaking, window-rattling Curtis Pitts-designed "Samson"; the list, like the show itself, goes on and on, and contains more top-drawer flying demonstrations than you'll see anywhere.

I spent a lot of time wandering around talking and taking photographs this year. Met an awful lot of interesting people willing to share their own perspectives on this gathering, and that's one of the aspects that I enjoy most about attending... the friendliness of everyone involved. From the EAA staff people like Henry Ogrodzinski and Golda Cox to fellow Warbird members like Howard Pardue and Bill Ross, everyone was willing to take some time to chat. On the ground you can find some of the most magnificent examples of home-built and restoration efforts to be seen anywhere. One example was a 1943 Stearman brought in by a fellow from Scottsdale, Arizona. He named the bipe the "Golden Phoenix" and after viewing it, the reason became obvious... nearly everything metallic on the airplane had been either gold- or chrome-plated! Not just the nuts, bolts and fittings... how about the oil cooler, wheel assemblies and a myriad of other parts! The finish appeared to be at least six inches deep and was glossy enough to shave in! Innovation in design and fabrication of home-builts abounded this year with numerous new, high-efficiency designs on hand. A number of these, like the Questair Venture, Neico Lancair and a delightful-looking ultralight, the Carlson Sparrow, caught my attention plus the attention of many others, judging from the crowds.

One thing I *did* manage to do this year, and would recommend you put on your "don't

Crowds exceeding 800,000 including over 1,800 visitors from 61 foreign countries came to see...

Two 51s vie for position.

miss at Oshkosh" list, is the EAA museum. This building houses some of the most rare, and in some cases, famous airplanes to be seen anywhere. The original BD-5 is here, along with Richard Bach's Jonathan Livingston Special, the XP-51, a Wright Flyer replica in a realistic diorama which includes sand from Kitty Hawk. For you scale guys, if you can't find it in "real life" on the floor, I'll just bet you can research it in the museum's library! The ongoing workshop sessions will show you how to weld, cover, build ribs plus nearly everything else a homebuilder worthy of the name can do. Under way when I dropped in was the building of a full-scale replica of the cockpit section of the Voyager made from the same molds as the original. It is destined to become a permanent display in the museum.

If I've created the impression that there is a lot going on *all* during the week, you've got the message. As I've done in the past Oshkosh reports, and since this was the biggest yet, let me give you some "trivial" statistics to help you appreciate the size of this gathering. Crowds exceeding 800,000 including over 1,800 visitors from sixty-one foreign countries came to see nearly 2,000 registered showplanes. That figure *doesn't* include the 13,000 transient aircraft that came and went during the show recording nearly 60,000 movements. That's four times busier than O'Hare in Chicago during the eight-day convention! Closer to the ground, this logistic blockbuster continues... 132 *tons* of ice, 32,000 hamburgers, over 40,000 hot dogs, 35,000 cups of coffee, all requiring the eventual use of 744 portable toilets and over 12 *million* sheets of toilet paper! There were 395 commercial exhibitors displaying their wares in nearly 800,000 square feet of space. Can you just imagine a Toledo show this size? Personally, I shot a lot of film, scribbled a lot of notes, made many new acquaintances and renewed some old ones. That's just the the kind of atmosphere the EAA creates at Oshkosh. Next year's dates are July 29 through August 5 for the 36th Annual EAA Fly-In convention.

More of Oshkosh on page 76.

RAF SE-5 A replica.

(Continued from page 58)

away some of the boxy look without much effort. Use it and the turtle deck for some sex appeal or forget it if you like.

COVERING: The first step we use is to coat the tank compartment, fuselage front and wing saddle areas with Epoxy resin to assure that it's fuel proof. Sand it smooth. We used Black Baron film for the prototype and found it simple to apply with excellent results. It was also used for the trim which went on easily. Nothing else was required.

PREFLIGHT: This is a responsive design. Using the inner servo arm holes for the first flights, you probably will not want more action after testing. You'll carefully check the radio operation and range test. A static engine check-out can also assure reliability. With normal .40s and even the Rossi, this should be no more than seeing a steady run and maybe a minor carburetor idle adjustment. But it is a good safety measure.

The Enya 4-cycle required closer attention and a change from normal practice. Flight experience showed a mysterious problem. The engine developed a burping tendency in the air as if the fuel was momentarily being turned off and on. A flying session with Ed Keck and his 4-cycle provided the solution. Ed suggested that the normal flexible tank pick-up line was being affected by the 4-cycle throbs. The cure was to use a piece of brass tube between the tank fuel outlet and the pick-up weight.

FLYING: This has to be the most enjoyable part of the Road Runner project. It all happens so easily, and is most

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ROAD RUNNER

(Continued from page 72)

relaxing! We tried various prop sizes with the Enya. It was notable that there was very little change in performance with a variety from 10 x 8 to 12 x 9. Even the static RPM remained constant in the nine thousand to ten thousand range.

You do need to keep the static RPM around or slightly under the ten thousand to ensure that you will not exceed the maximum 12,500-range in the air. We settled on an 11 x 7 as being a productive size. This also proved true for sport flying with the Rossi. For racing, the 9 x 6 to 7 area is a good place to investigate. On take-off, with ample power, the R.R. jumps into the air with a minimum of steering. Do remember that it's a tail dragger, and start the run into the wind. Once into maneuvers watch the loops for drift. There should be none. If there's a problem, the cause is the airframe alignment. In your workshop, set the airframe on a flat table. Check *everything* for squareness and/or for warps. Balance the model on the wing center line and, if needed, add tip weight to get a neutral balance. Correct any other findings and repeat the trim procedure. In the end your Road Runner will fly effortlessly and neatly; well worth the time taken to bring it about.

Landings are last, of course, and if you've reached this far there should be no problem with them. However, I should tell you that the Road Runner is a low drag design and as such can cover a lot of ground while you are slowing it down to hit your spot. So, start in far out and low down, allowing it to bleed its speed off before the flare.

Simplicity is a major asset of these sport racers. It is so rewarding to have something requiring so little attention and providing so much good fun. Hope you enjoy your Road Runner as much as we are enjoying ours. You might even win a few races for the "ole gipper"!

**The following are the addresses of the manufacturers mentioned in this article:*

Model Rectifier Corp., 2500 Woodbridge Ave., Edison, NJ 08817.

Altech Marketing, P.O. Box 286, Fords, NJ 08863.

Condor R/C Specialties, 1733G Monrovia Ave., Costa Mesa, CA 92627.

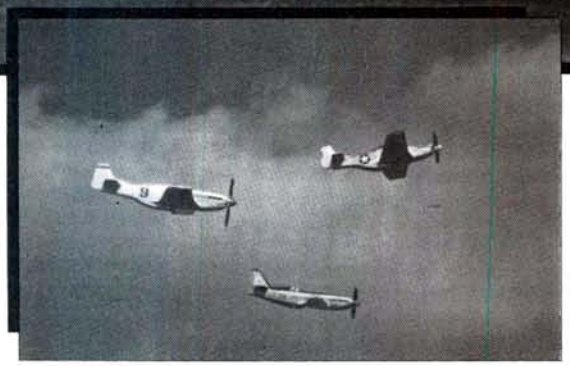
Coverite, 420 Babylon Rd., Horsham, PA 19044.

Midwest Products, 400 S. Indiana St., Hobart, IN 46342.

Sig Manufacturing, Montezuma, IA 50171.

Four Most Products, 4040 24th Ave., Forest Grove, OR 97116. ■

The venerable Republic Seabee, this example is probably better than new.



CLOCKWISE... ⟶

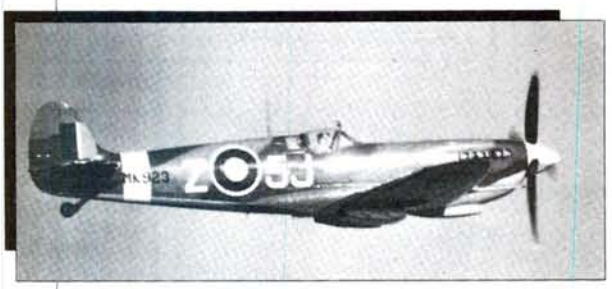
Cliff Robertson's Spitfire MK IX

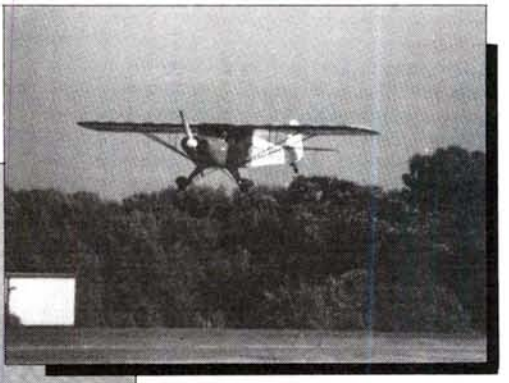
Duane Cole's landing... deadstick!

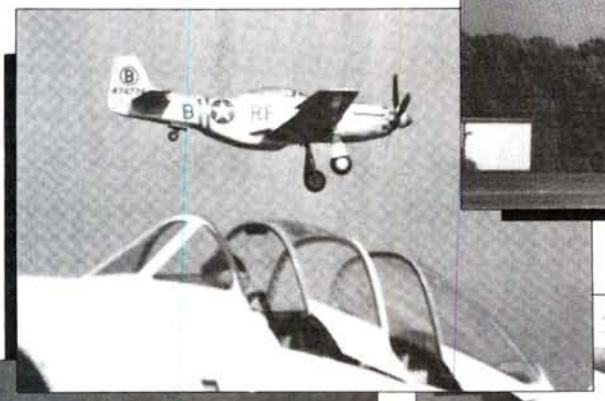
P-51 on final overflys a T-28.

Aeronautical art... Robertson's Spit MK IX.

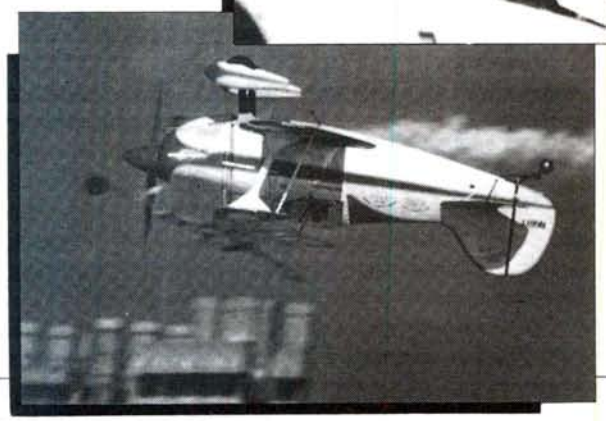
Mock race, Leeward's clipped wing P-51 trails Tsunami as Pace P-51 pulls up.

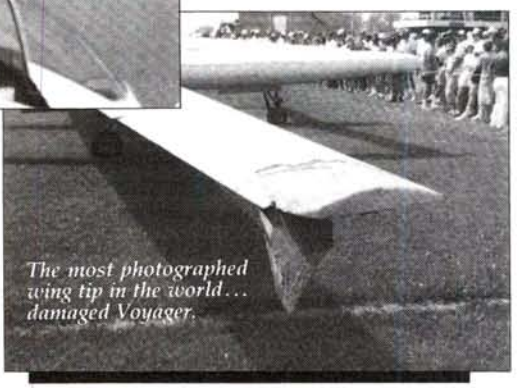






Bob Herendeen and his Pitts at the moment of his inverted ribbon cut.





The most photographed wing tip in the world... damaged Voyager.

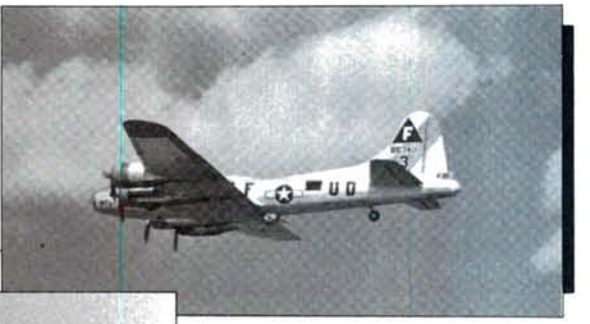
Oshkosh '87

(Continued from page 71)

World Class pilot Leo Loudenslager put on an incredible show in his Bud Light Laser.

Naval aviator flight outfit circa 1942, Grumman Duck on display in EAA Museum.

A couple of generations of naval aviation, Stearman over Skyraider.



Restored UPF-7 Waco, one of many classics.

Above: B-17 Flying Fortress flew during the "Salute to The Heavies" show.
Left: Massive Douglas A-1 Skyraider cast giant shadows.

Above: One literally wears the BD-5J, Bob Bishop and Dave Hoover prepare to launch.
Left: Home-built Q-200, lots of canards were on hand.

SILENTIUS

(Continued from page 64)

The 3:1 geared Graupner motor is mounted on hardwood bearers, driving the folding propeller by a 2½-inch, 4mm diameter music wire shaft. This design approach facilitates a slim fuselage profile since the fuselage front end can taper sharply into the spinner. The folding propeller assembly houses a shock absorber system inside the spinner which is designed to reduce some of the start-up and shut-down loads as the propeller blades open or close. As seems to be common to most of the European folding propellers, the prop assembly is clamped to the 4mm shaft by two set screws. Note, however, that the Silentius' propeller mounting configuration will not easily accommodate the typically American mounting configuration (¼-inch diameter shaft, propeller nut). Sure would like to see an adapter for Leisure and Astro motors to allow use of German folding propellers—perhaps one can be made available?

The Miniblitz electronic speed controller (ESC) is an attractive option for either electric planes or cars. Weighing about an ounce and a half, it allows proportional control of the electric motor, plugging into the receiver's throttle channel. Its price is very reasonable, especially considering that it provides a braking function to stop propeller windmilling when power is removed. There is one feature of the ESC that I was not comfortable with, however. It is set up with battery eliminator circuitry (BEC), which supplies the radio receiver with voltage tapped off the motor battery, eliminating the need to carry a separate battery for the radio. This is very common for racing electric-powered radio-control cars where the weight savings are significant. As the motor battery uses up its charge, however, there will be a point where power to the receiver will be lost. When running cars, the car will slow noticeably just prior to losing radio receiver voltage. The newer radio systems for cars use special circuitry to provide protection against total loss of control.

An electric-powered glider presents a different situation, however, since the plane may be flying under power quite some distance away when the motor battery voltage drops to this critical level. In this situation, it may not be apparent that radio-receiver voltage is dropping to critical levels until control is lost. To prevent this from happening, I rewired the ESC's receiver connector so that only signal (yellow wire) and ground (black wire) are connected to the receiver's throttle channel; the 4.8V from the motor battery intended for the receiver (red wire) was not connected. This allows for the use of a standard flight battery connected to the receiver in the conventional manner. The ESC's installation instructions warn against simultaneously hooking up both ESC receiver voltage and voltage from an airborne pack.

FLYING: Completely equipped and ready to go, my Silentius weighed in at 56 ounces, just slightly under the spec weight listed on the plans; motor battery is a 7-cell, 800 mAh pack, and receiver battery is a 250 mAh mini-pack. It's clear that at this weight the Silentius was not designed as a "floater" type motor-glider. With this key point in mind, let's look at its flying ability.

To date I have flown the Silentius in weather conditions ranging from completely calm evening air to slightly windy middle-of-the-day conditions. The angle

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SILENTIUS

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of climb-out should be kept fairly shallow until the plane gains sufficient speed. If the first flights are in completely windless conditions, it is best to actually maintain level flight until the plane accelerates to a comfortable flying speed. Once "on the step," the Silentius climbs smoothly and surprisingly quickly to altitude. Incidentally, about 1/8-inch tip washout (trailing edge up) improves its handling significantly and should be incorporated prior to first flights.

Once the motor is throttled back and the prop blades folded neatly against the fuselage creating an extremely low-drag configuration at the hub, the Silentius really comes into its own. Compared to a "floater" type of electric sailplane,the Silentius is capable of searching farther and faster to seek out rising air. Since its sink rate is extremely low at moderate cruise speeds, it is extremely intriguing to be able to explore a huge volume of air rather than get trapped, unable to outrun sinking air. Once in rising air, its handling characteristics are excellent.

I will close with this interesting data point. Flying in absolutely dead calm evening air, I was able to fly side by side with a 2-meter span winch-launched glider of the floater variety. Both of us were trimmed for minimum sink since there was no thermal activity. Using my motor-throttling capability, I was able to control my altitude so that both gliders started their glides from the same height. The results: in ten flights, the much lighter glider was landing while the Silentius had lost only about a third of its initial altitude. Individual pilot skill? Reynolds' number effects? Airfoil? I prefer to conclude that my Silentius was more efficient than the floater on that given day, and I intend to repeat those comparisons to substantiate my initial hypothesis. It is apparent that flying weight is not the only parameter that should be used to gauge aircraft performance. Nevertheless, I am very satisfied with the broad speed envelope and efficient handling characteristics of the Silentius.

CONCLUSIONS: The Graupner Silentius 86 with its geared electric propulsion system was a very satisfying package to build, fly, and review. Build one and fly silently!

**The following are the addresses of the companies mentioned in this article:*

Hobby Lobby International, Inc., 5614 Franklin Pike Circle, Brentwood, TN 37027.

Carl Goldberg Models, Inc., 4738 West Chicago Ave., Chicago, IL 60651. ■

ANTENNAS

(Continued from page 18)

But the air is full of miscellaneous radio signals. If our R/C receiver is getting a weak control signal input from its antenna, and a stronger extraneous signal comes along, the receiver responds to that instead, and a "glitch" occurs—or maybe even a complete loss of control. That's why it's always good practice to do everything possible to maximize the signal that our R/C receivers get. A good, strong input will often overpower random interference. We can't increase the output power of our transmitters because of FCC rules. But we can improve our antennae—or at least make sure we don't do anything that degrades their performance.

For example, never change the length of the antenna wire, or double it back on itself. Its length, like the length of a harp string, has much to do with its frequency response. Here's why. The antenna and its receiver operate within the varying electromagnetic field sent out by the transmitter, whose electrical impulses reverse their polarity about 144 million times each second. When the first of these impulses arrives at the receiver's antenna, it instantaneously begins conducting through the wire. The current speeds along the antenna, at 186,000 miles an hour, until it has to come to a sudden stop at the wire's end. If the antenna is just the right length, this electrical impulse reaches the end of the wire and bounces back from it at exactly the same time the electromagnetic field reverses. Thus, the returning impulse gets a helpful backward push. It rushes down the antenna the other way, until it reaches the opposite end, where the procedure repeats itself. Over and over again: 144,000,000+ times per second, the antenna current changes direction.

This pulsating electrical current is what works the receiver. Its voltage is incredibly low: around two or three millionths of a volt when the model is a few hundred feet away from the transmitter. That's why it's so important for the antenna to do the best possible job. Every millionth of a volt is vital! If the receiver antenna is not the right length, the electrical impulses surging back and forth along it will be out of phase with the transmitted electromag-

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ANTENNAS

(Continued from page 82)

netic field. Instead of strengthening the input to the receiver, as a properly "resonant" antenna does, a wrong-length antenna delivers a weaker, unreliable signal.

The best type of antenna for R/C model use is a vertical whip. That's why all our transmitters have them. But no R/C system manufacturer equips his receivers with a whip antenna. That means we have to do the job ourselves.

I've been using vertical whips on all my R/C models for years with excellent results. There's nothing difficult about it either. The whip itself is made from music wire, 1/32-inch or 3/64-inch diameter. Connecting this to the receiver usually requires a little engineering; models vary a lot in size, configuration, and receiver location.

The general method is to bring the receiver's flexible antenna wire to some convenient attachment location on the top of the model, then cut it at this point. A one-pin female connector is then soldered to the flex wire. The music wire whip has the male one-pin connector soldered to it. The overall length of the new antenna system, from the receiver case to the extreme end, *must be exactly the same as the length of the original antenna.*

There are a few important details to make sure of. First, reinforce the soldered connection between the flex antenna wire and the one-pin connector with an inch or so of shrink tubing. This will prevent the antenna wire breaking at the junction from vibration or flexing. Second, attach a 1/4-inch plastic or wooden bead to the upper end of the whip with epoxy or CYA. This will prevent injury from the wire end. Third, anchor the receiver side of the one-pin connector firmly to a strong part of the model's structure. There is appreciable stress and strain at the whip antenna base, so it needs to be sturdily mounted.

There is one other technique that can be used to improve an R/C receiver's input signal strength, and make it more resistant to interference: it's called "bonding."

A few paragraphs back I described the varying electromagnetic field that our R/C antennas operate within, but I didn't say anything about what this field varies against. After all, the receiver has to have some fixed reference with which to com-

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ANTENNAS

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pare the incoming signals. This reference is what's known as the "ground plane." In most R/C setups it's merely all the electrically-conductive components that are connected to the negative side of the battery. With today's miniaturized receivers and servos, and their tiny printed circuit boards, the ground plane's major elements are the batteries themselves plus their wiring.

However, especially in large-size R/C models, the "ground plane" can be made much bigger and more effective. This is done by simply tying the major metal components together electrically. A "bonding wire" that connects the engine and landing gear to the negative battery terminal is usually all that's needed. Bonding has an extra benefit, too. It kills any tendency of, say, a long-legged landing gear wire to act as an antenna itself. An unbonded l.g. wire just might pick up extraneous radio signals within its own "resonant range" and re-radiate them to the receiver antenna, as the "reflector" elements of a TV antenna do.

Remember: our airborne R/C systems operate on incoming signals measured in millionths of a volt. Let's do everything we can to help our receivers pick up exactly the right signals, as strongly as possible, and reject all the other radio-frequency impulses that fill the airwaves. Our models will fly better, and we'll have far more reliable control. ■

GOLDEN AGE

(Continued from page 57)

trol until something else was desired. Such a system required special piloting skills, which was very unlike full-scale practice.

Proportional, as applied to R/C, means that the control surface follows the control stick movement proportionally. Slight movement of the stick produces slight control movement. This applies to all controls as they can be used simultaneously, exactly duplicating full-scale and allowing the R/C pilot to fly his plane continuously. The thinkers of yesteryear knew that this was most necessary for us to reach the plateau which we are on today.

History generally divides proportional systems into three categories which evolved in the following order: pulse systems (incorporting the multi-channel versions using pulse coding), the analog, and the digital. The names relate direct-

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GOLDEN AGE

(Continued from page 88)

ly to the method of coding used to provide proportional action. It is also important to note that the advent of the transistor and Ni-Cd battery made these systems possible and practical.

When we look at a complete, early R/C system, we are first impressed by the appearance of the large transmitter with its sticks, levers, and meters. The size of the receiver and the batteries is also an eye opener. The least important appears to be the small servos, yet they are at the heart of the entire system! The rest of the components mentioned allow the pilot to tell the servos what to do. The type of response provided by the servo is what differentiates the various styles of R/C systems.

All servos, except proportional, simply move from neutral to full deflection and back. The advantage of the proportional servo is that it moves from neutral in increments that you choose. They also can be commanded simultaneously.

If the servo is at the heart of the R/C system, then the heart of the servo is the motor. The initial servo motors were copied from those used in the toy industry. As such, they were as simple as could be, but not precise enough for the demands of a proportional-type servo. An exception might be the English Mighty Midget motor, which did yeoman work with the early pulse systems. By itself, it served as an acceptable actuator, but when added to a complex servo, it didn't work out. Thus, a need for a more sophisticated motor. The solution to this complex problem came from the Swiss clock industry in the form of the Micro Mo, an example of extreme motor development now being duplicated for use today.

The Micro Mo was an industry marvel. A maze of micro fine wire molded in plastic to form a thin, cup shape field coil, fitting closely around the centered, stationary magnet. The brushes were also delicate wires.

The Micro Mo motor was different from the norm because the magnet was in the center of the housing; the armature revolved around the magnet. This offered a great gain in efficiency as with equal power the motor used less current. It was responsive, and therefore ideal for R/C needs!

We now have the history of proportional R/C started. If you have anything to add, especially information about early R/C manufacturers, please send it in. Anything at all can add to our knowledge and interest.

Hal "Pappy" deBolt c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

GIANT STEPS

(Continued from page 55)

OK, so what do we need to get started, once all the material we are going to need has been collected, sorted and catalogued? (What? You didn't put in some sort of order so you would find what you wanted? Better do that or you'll spend more time looking for details than you'll spend making the drawings.)

A good drawing table is a necessity. It doesn't have to be a full-blown commercial drafting board, with a fancy drafting machine, however nice that would be if you had it. A good work surface should be about 30 to 36 inches wide and anywhere from 5 to 8 feet in length. Anything smaller is a bit too small for 1/4 and 1/3 scale: anything longer gets to be a bit much if your space is limited. Ideally, the surface should slant at a

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GIANT

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comfortable angle. Some prefer a shallow angle, some prefer to work on an almost vertical board. What you are most comfortable with is what you should use.

The board may be made from plywood, or any convenient material. It doesn't even have to have a smooth surface. It's easiest to draw on a surface which has a slight resilience to it. And the cost of buying and installing a commercial drafting-board surface material is money well spent. This is a rolled plastic material, it's quite thick, and has a slightly "spongy" feel to it. It makes working at the drawing board a lot easier and it reduces the cost of the material the base is made from, as it doesn't have to have a super finish on it.

Now for the tools. Number one is a good-quality drafting set. This should be good equipment as it has to do things very accurately. It doesn't have to be elaborate and include everything in the world. Just a basic set of drafting instruments is all you need: drawing pencils, a good-quality T-square and some triangles, as wide an array of sizes and types of French curves as you can find and afford, a couple of good scales (triangular rulers) one engineering (in tenths of an inch) and one standard (in the usual array of scales). The engineering scale will be handy as you'll be using a calculator for altering measurements and the calc can't handle 1/16, 1/32 and all those other neat measurements we're used to; it needs to work in decimals and the engineering rule will do that admirably.

That's the minimum you need to get started. There are others of course, a nice set of proportional dividers is handy, but ones large enough to be of much use in 1/4 and 1/3 scale will be expensive. They can be done without and you could always make your own.

Unless you are an expert at lettering, get a few lettering guides. Especially if you have aspirations to sell your plan. If the notes on the plan sheets are not readable, save your time and don't add

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GIANT STEPS

(Continued from page 92)

them. Better still, use a lettering guide.

Now you can put that piece of Mylar on the drafting table and prepare to start drawing. And I mean Mylar, not butcher paper, or shelf covering or anyting else. The plan you are doing may be just for your own use, but if it becomes popular and others want to build from it, or you want to market it, having it on Mylar will permit you to reproduce it easily, conveniently and inexpensively. Otherwise, you'll have to transfer it to Mylar anyway, so why not eliminate the hard part and do it on Mylar in the first place?

To sum up for this month: gather everything you can find on the chosen subject, choose a specific airplane to model early on in the work, and don't deviate from your choice once it has been made. You may find details you'd like to incorporate, but if you can't document them, don't use them. You might just run up against a judge who knows your airplane better then you do!

There is no substitute for careful preplanning and nobody ever failed from knowing too much about this subject. The trick is in making intelligent choices early on and sticking with them. ■

ENGINE REVIEW

(Continued from page 17)

employ exhaust (muffler) pressure. Exhaust gas pressure automatically reduces as the throttle is closed and maintains a usefully balanced flow of fuel at the carburetor at all speeds.

However, muffler pressure is not the complete answer where both immunity from pressure variation and a maximum power are required. Here, it is necessary to have the fuel reach the engine from the fuel tank at relatively high pressure and for it then to be metered to the carburetor precisely as demanded by the engine.

One way in which this can be done is for the tank to be pressurized by using the crankshaft rotary-valve to release only positive pulses from the crank chamber to the tank and for the resulting high fuel pressure to then be controlled by a pressure regulator located close to the carburetor. Such a system has been used for some years by the Japanese Yamada YS engines.

Another method is to employ an engine-driven pump to draw the fuel from an unsealed tank, the pump itself being fitted with a fuel delivery pressure regulator. The pump can be operated via a dia-

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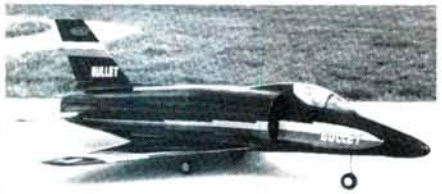
Product News



BYRON BULLET

The new Byron Bullet Sport Jet features inboard ailerons for crisp control and flex-free continuous-loop control yoke for positive and reliable stabilator response. No flaps are required. The Bullet is designed to take full advantage of the same easy assembly techniques that Byron Originals incorporates into al its other fine kits. Other features include: a lightweight and strong hand-laid fiberglass fuselage; easy-to-finish injection-molded, retract-ready wings and tail surfaces; aileron servo cavities and airline routings performed in the wing; Byron's unique plug-in wing concept; removable horizontal stabs and vertical fins, and all necessary hardware. Designed for use with a .77 to .90 engine and a Byro-Jet fan unit. For more info contact Byron Originals (P.O. Box 279 Ida Grove, IA 51445).

SAAB AJ37 VIGGEN

The 1/9.5-scale Viggen from Cressline Model Products (635 Third Ave., Park Falls, WI 54552) features a polyester fiberglass fuselage, molded inlet liner, engine cap cooling cover, exhaust tube, vacuum-formed canopy and trims, foam core wings and rudder, all wood necessary to complete the kit, hardware, and a complete instruction manual including plans and template sheet.

.40 RC STANDARD

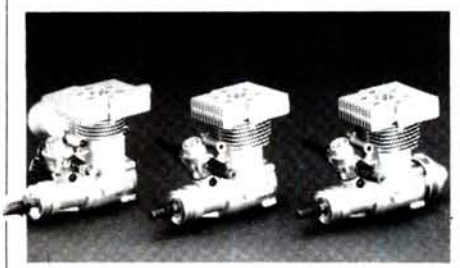
Fox is entering the competitively priced .40 RC market with their 40 RC Standard. The Fox Standard features a double ball bearing main. Fox claims this is the most powerful engine in its price range and is easy to start. Like all other Fox RC engines, it has been test-run at the factors. These motors are now in stock. For more information contact Fox Manufacturing Company (5305 Towson Ave., Fort Smith, AK 72901).

TOPAZ II SAILPLANE

The Topaz II Sailplane from Hobby Lobby can be built with either a 124- or 136-inch wingspan. The structure is composed of conventional balsa and spruce with the added feature of a cut foam obechi-presheeted top deck for building simplicity. The wing loading, at 3 pounds, will be in the area of seven ounces per square foot, making the Topaz the ideal thermal soaring sailplane. With a 124-inch wingspan, the wing area is 922 square inches, and with a 136-inch wingspan the wing area is 1060 square inches. Fuselage length is 54 inches. Designed for two- or three-channel radio systems. For more information contact Hobby Lobby International (5614 Franklin Pike Circle, Brentwood, TN 37027).

KYOSHO ELECTRIC

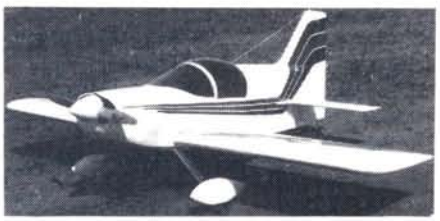
The new Kyosho Ballad from Great Planes Model Distributors (P.O. Box 4021, Champaign, IL 61820) is the latest in Kyosho's series of small electric-powered airplanes that can be flown anywhere. The Ballad is a parasol-type trainer with a wingspan of 35 inches. It features a blow-molded fuselage, OHS wings, and a LeMans AP-29 electric motor. The kit even comes with a battery pack and charger. This kit is ideal for the flyer who doesn't have a flying field in the area.



HELICOPTER ENGINES

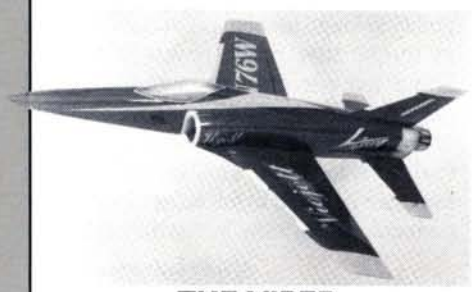
O.S. Engines, the most trusted name in model engines, has recently introduced two new helicopter engines, both designed to give plenty of power to any .25- to .30-size helicopter. The O.S. .32 F-H features Schnuerle porting, a ball bearing supported crankshaft, and a large heatsink head for cool running. The new 3H carb provides smooth, reliable power, and is very easy to adjust. The O.S. .32 F-HS has all the great features of the .32 F-H, plus a rear start cone! Great for fuselages where belts and pulleys are impractical; it's the easiest, most powerful helicopter engine of its size. For more information contact Great Planes Model Distributors (P.O. Box 4021, Champaign, IL 61820).

Descriptions of new products appearing in these pages were derived from press releases by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by **Model Airplane News,** or guarantee of performance by **Model Airplane News.** When writing to the manufacturer about any product described here, be sure to mention that you read about it in **Model Airplane News.**



1/3 SCALE BD-8

This aircraft was designed by Jim Bede to be used in world acrobatic competition. Its unique airframe doesn't know what attitude it's in aerodynamically. With a wing loading of 23 ounces per square foot, the performance is astounding. The BD-8 is an all-wood kit except for the fiberglass cowl, has a wingspan of 73 inches, a fuselage length of 63 inches, and uses a Q-40 engine or larger. For more information contact Custom R/C Aircraft (249 Robin Way, Santa Rosa, CA 95407).

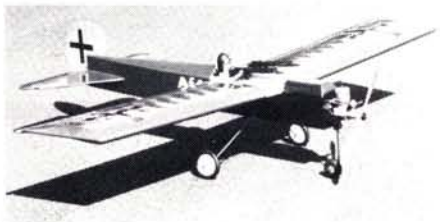


THE VIPER

The sleek aerodynamic styling and use of three high-lift devices on the wing allow this new sport jet to operate in a wide envelope of performance from 25 to 175 mph. Flaperons, LEXs, and NACA droops, devices that are simple to install and allow very stable slow flight, form the high-speed thin airfoil featured on the Viper wing. The use of high-tech materials, such as carbon fiber, epoxy glass and kevlar, and glass balsa laminate allow the Viper to have an easily removable wing, yet maintain superior strength and a 9.5 pound ready-to-fly weight. Propulsion is provided by the patented Voijett fan and KBV .72 engine without the use of large out-of-scale inlets or cheater holes. For more information contact Bob Voilett Models (1373 Citrus Rd., Winter Springs, FL 32708).

PILOT BUST KIT

D.G.A. Designs (135 E. Main St., Phelps, NY 14532) announces the release of three new pilot bust kits. Shown here is the Jet Pilot kit, available in ⅛- and 1/7-scale as kit Nos. 308 and 307, respectively. Each pilot has the new-style jet helmet molded to the head and also contains a realistic face mask and oxygen hose. The figures are made of vinyl latex rubber and weigh less than ½ ounce. They're easy to finish and come complete with instructions. A Barnstormer/Sportsman pilot bust is also available in ⅛-scale as No. 108. This is an ideal addition to .40-size planes. See your local dealer or contact D.G.A. Designs.



SORTA-SCALE FOKKER

The Fokker is Coverite's latest entry to the Sorta Scale line of R/C planes. The kit features a pre-cut tail section, preformed landing gear, Black Baron molded pilot figure, full-color decal sheet, complete hardware pack, and step-by-step illustrated instruction manual designed for the first-time builder. The Fokker weighs approximately 5 pounds, has a wing span of 56 inches, with 560 square inches of wing area, and uses a .40 two-cycle or .46 four-cycle engine. For more information contact Coverite (420 Babylon Rd., Horsham, PA 19044).

HELICOPTER SPACECASE

The SC-2040 Helicopter SpaceCase is specifically designed for the Bell 222/Airwolf fuselages by Rotary Wing Concepts, Larry Jolly, and Kalt. The SC-2050 Helicopter SpaceCase is designed to carry .50- to .60-size pod and boom machines including models manufactured by Robbe, Champion, Miniature Aircraft, Gorham Model Products, and Kalt. These helicopter SpaceCases are molded from tough, textured ABS plastic and require no finishing. All materials necessary are included to customize the interior and install the handle at the proper balance point. For more information on these cases, as well as the complete line of SpaceCases, contact Matrix Enterprises, Inc. (7015 Carroll Rd., San Diego, CA 92121).

P-51 MUSTANG

The latest entry to Wing Manufacturing's line of Easy-Build Short Kits is the WWII P-51 Mustang. Designed around a foam wing and box frame, the Mustang is intended for the sport flyer who wants a model that looks realistic but is easy to build and fun to fly. The short kit includes detailed plans with templates, molded cowl, clear canopy, molded belly scoop, exhausts, gun ports, plywood firewall, motor mount, short hardware package and bill of materials. The Mustang has a wingspan of 55 inches and takes a .25 to .40 engine. For more information contact Wing Manufacturing (P.O. Box 33, Crystal Lake, IL 60014).

ENGINE REVIEW

(Continued from page 94)

phragm that is actuated by the positive and negative pressure pulses within the engine's crank chamber, as featured by the well-known Perry Pump system. Alternatively, it can be mechanically driven, as in the case of the crankpin-driven gear-type pump used by the O.S. FS-120S four-stroke-cycle engine.

The O.S. PA-102 system intended only for two-cycle engines, is operated by the crankcase pressure pulses. Like the Perry pump, the O.S. Type PD-02 pump is fitted directly into the crankcase backplate and is of sandwich-type construction but has rather more parts than the Perry and is factory sealed against user adjustment. The pump unit uses six aluminum castings, a metal pump diaphragm, a plastic regulator diaphragm and sundry valves, springs and gaskets. It has four inlet and outlet nipples: an inlet through which fuel is drawn from the tank; an outlet to deliver fuel to the carburetor; a return through which excess fuel is dumped back in the tank, while the fourth nipple connects the regulator chamber to the carburetor below the throttle to sense manifold pressure.

The matching Type 86 carburetor has a massive 12mm bore that is only slightly restricted by a butterfly-type throttle valve so that, at full throttle, the minimum choke area is still a whopping 95 sq. mm. The carburetor has an automatic mixture control valve through which fuel passes before being released through a jet hole in the center of the throttle butterfly. The mixture control valve is manually adjustable, very easily, by means of an eccentric headed screw and yoke, as used on the O.S. Type 7L carburetor fitted to the standard non-pumped engines. When correctly set to achieve the best idling performance, the mixture control valve automatically takes care of mixture strength over the entire throttle range.

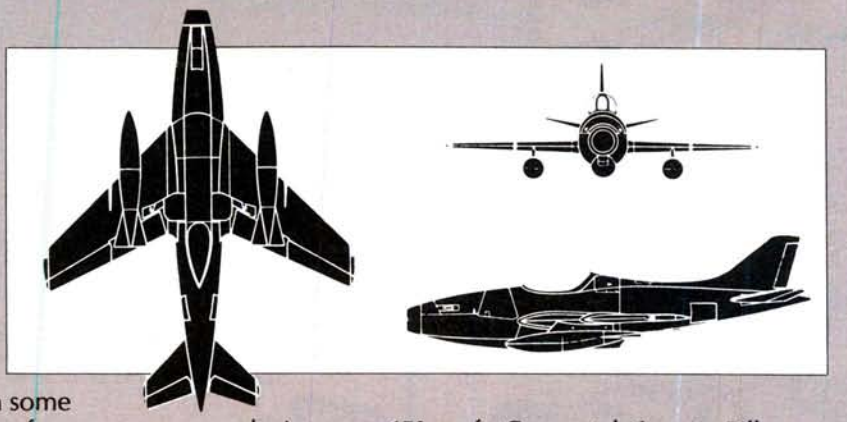
There are no other adjustments to make. The pump unit has two adjusting screws but these, as previously mentioned, are factory set and sealed. The user is cautioned not to touch them and not to disassemble the pump. It was to console those engine buffs who have difficulty in containing their curiosity that, for this article, we disassembled a spare pump and photographed the parts.

Apart from improved operational reliability through maneuvers and an increase in torque that raises power output by about ten percent, the pump-equipped Max-61 long-stroke engines are immune to the problems usually associated with fuel tank location. This means that the tank can be fitted in the most desirable or convenient position in the fuselage; for

(Continued on page 104)

NAME THE PLANE CONTEST

Can you identify this aircraft?



If so, send your answer to **Model Airplane News,** Name the Plane Contest (state issue in which plane appeared), 632 Danbury Rd., Wilton, CT 06897.

The Kanya (Kite) had been built in some numbers by the Sportarutermelo factory for Hungarian flying clubs. First flown with a 139hp Walter Major 4-1 engine, the Kanya was extensively redesigned for production, the first series receiving the 160hp Walter Minor6-III engine. This version was followed by the Kanya II (the Rubik R-18 being pictured here) with the Hungarian-built M-IIFR five-cylinder radial engine. The plane had S.T.O.L. capabilities with its leading edge slots and trailing edge flaps. Span, 38 ft.; length, 24 ft.; height, 7 ft. and wing area, 150 sq. ft. Congratulations to Bill Gosham of Sequim, WA for correctly identifying the November mystery plane.

The winner will be drawn four weeks following publication from correct answers received by postcard delivered by U.S. Mail and will receive a free one-year subscription to **Model Airplane News.** If already a subscriber, the winner will receive a free one-year extension of his subscription.

Club of the Month

The Rocky Mountain Flying Machine of Rio Rancho, New Mexico is our "Club of the Month" for January 1988.

This band of modeling enthusiasts, headed by president Joel C'DeBaca, sponsors events such as the "Flight to Santa Fe" (for which the highly esteemed president's plane was infested with gremlins), annual picnics, monthly videos at the club meetings, a Halloween party, attendance at many of the other area club events, and even a "Brass Monkey Breakfast"?!

The Flying Machine is currently flying on an unpaved runway, as are many other small clubs, but they are progressing towards a more modern facility with the addition of cement pit areas, and the frequent use of a large roller to flatten the runway until a blacktop is within the club's budget.

The club newsletter "Flying High," edited by Wayne Brummett, is published monthly and forwarded to club members to keep them informed of all club happenings. It includes notes from the club president, and a variety of other informative columns reporting on the club's past events and meetings, updates on the latest AMA and club rules, and future club events.

The staff at *Model Airplane News* tip their hats to the Rocky Mountain Flying Machine, and other clubs like them, who have the ability to take a routine trip to the flying field, and turn it into a variety of exciting events that can be enjoyed by not only active flyers, but by their families as well.

We at *Model Airplane News* are proud to award to the Rocky Mountain Flying Machine two free one-year subscriptions, which are to be given by them to a couple of the club's outstanding members.

P.S. Congratulations to "Hop-A-Long" Peterson on the clean sweep in the "Belly Flop and Cannon Ball" contest, and to Jimmy Freeman for the killer green chili stew at the annual picnic. ■

Each month Model Airplane News will select the club newsletter that best shows the club's activities and energies directed toward the furtherance of the hobby. The award is not based on size or quality of the newsletter, and can be about any aspect of the hobby (F/F, C/L, R/C, boating, cars, etc.). Model Airplane News will award two free one-year subscriptions to be given by the club to outstanding junior members. So send your newsletter to Model Airplane News, Club of the Month Contest, 632 Danbury Rd., Wilton, CT 06897.

ENGINE REVIEW

(Continued from page 98)

example, close to the aircraft's center of gravity or where it does not obstruct a retractable nosewheel unit.

Two examples of the Max-61 are shown in the photographs, the Max-61RF.ABC-P and the Max-61SF-P. Except for its PA-102 Pump System, the 61RF.ABC-P is the same as the Max-61RF.ABC reviewed in the February 1987 *Round-Up* and we are not, therefore, repeating our detailed description of the other features of the engine. We suggest that readers who have not already done so might care to refer to this previous coverage for further technical information and explanatory comment.

The Max-61SF is, as already noted, the side-exhaust companion model of the 61RF and, with the exception of its body casting and a modified piston, is assembled from the same parts. All these engines are of robust construction and top-notch quality throughout. ■

AMPTIQUE

(Continued from page 61)

delivered from Leisure, bolts right into Amptique's firewall and the 800 mAh pack (a true wonder since it runs this unit better and longer than the older and heavier 1200 mAh 6-cell packs) fits perfectly into the rack described on the plans. As instructed, I ran the Leisure power unit for an hour to seat the motor brushes. This process saw a substantial improvement in smoothness and power from beginning to end. The only problem I encountered was with the on/off switch supplied with Leisure's sytem. This was, I believe, simply a defective part. However, time was short and a replacement could not be obtained from Leisure so I replaced the switch with a Radio Shack sub-min lever switch #275-016.

The switch was mounted with double-stick tape directly to a control servo in a manner that permitted its servo arm movement to actuate the swtich. Indeed, I used double-stick tape to mount the control servo and surface servos to the airframe. I reasoned that vibration and shocks were minimal in this airplane and results confirm this. While typical modern servos can be installed in Amptique, I used KPS (Kraft) 18 servos—perhaps the smallest yet produced. Frankly, I used them only because I was looking for maximum weight reduction. Further, I powered the airborne system with a pack of 180 mAh cells from Radio Shack with one of their sub-miniature switches. It all made for a very light installation.

The radio was a borrowed 1971 Kraft Tx and Rx from Jonathan's dad, Ed, curator of the Welsh R/C Museum. Ed

(Continued on page 106)

AMPTIQUE

(Continued from page 104)

has a lot of equipment that's long past its prime and, son-of-a-gun, it always works. It did for Amptique which simply proves age is not our only problem!

SET-UP: Both elevator and rudder were set at movements of 3/8-inch off center. This was a guess since neither plans nor instructions gave a hint in this area. The control settings, fortunately, seemed just right for this airplane. All flight surface angles were checked against plans, and the airplane was completely measured to be sure nothing was out of "whack." Nothing was—a positive testimony to Jonathan's building.

Using small servos and a small battery pack, your CG should come out on the nose if you use the suggested arrangements. Larger components might require shifting. In any event, use the airborne components to balance Amptique; one doesn't want to add lead of any amount to an electric airplane.

FLYING: Amptique lived up to its billing as a trainer. There is little one can do that can't be corrected by simply releasing the controls. Of course, Amptique can be crashed if one holds some given control input. But given altitude and some reasonable thinking (consider that as an instructor able to take over) the airplane can survive. It's very soft in flying qualities. While pitch and yaw are positive, the airplane does not react so quickly as to confuse or upset a first-time flyer. For those using Amptique as a first-time effort in electric flight: welcome! You'll have a ball and you'll find you can fly almost anywhere. Silence is, indeed, golden. The airplane, if one cuts power and glides around, thermals nicely and can give 15- to 20-minute flights on a single charge. By the way, I used Leisure's Auto Charger for 6/7 cells for all charging requirements. The most fun with Amptique can be had wresting maximum flight time from it. Indeed, on a few occasions, I was asked when my flight would be over. It seems some of them were very long!

All in all, I can happily recommend Leisure's Amptique as an R/C trainer sport airplane or an entry point to electric flying. It does everything it claims, it comes from a fine kit and we all enjoyed the project. Jonathan agrees!

**You can write to Leisure at: Leisure, 22971 "B" Triton Way, Laguna Hills, CA 92653.* ■

KITTIWAKE

(Continued from page 46)

There are a few hints we can give regarding assembly. Chief among them is the recommendation to install the engine prior to gluing the cowl ring in place, as it's just too hard to do in reverse, as suggested in the instructions. As Top Flite suggested, we used a muffler extension to permit side mounting. George elected to install the small Futaba servos because of the tight fuselage section. He waterproofed the MonoKote seams on the wing in case the tips dip in on crosswind taxi manuevers, and also mounted the tank sideways in the fuselage for the extra clearance with the vent pointing up.

After all the tricky stuff was done, the MonoKote covering was applied, control surface throws checked once more, and the throttle trim set up to kill the O.S. .28F when required. It's impossible to fault this little jewel of an engine. O.S. has been making a quality product for a long time, and the .28F, with its lapped piston, Schnuerle porting, ball bearings and excellent machining, is a tireless and extremely reliable performer. We took it out of the box, put it in the KittiWake with a 9-6 wood prop, and flew it. Idle, midrange, top end and transition were all just fine. This is an exceptional product and a great bargain.

With the tank empty, the KittiWake weighed 3 pounds, 20 ounces for a 25.4 ounce wing loading. The total weight was 2 ounces over Top Flite's projected weight, but that's probably because we glassed the float and stuffed in the biggest recommended powerplant. Test flying took place on two recent Sundays with weather conditions ranging from hazy sun to overcast, with winds in the 2 to 10 mph range and surface conditions going from a glassy surface to 3-inch ripples with an absence of swells. If we had to pick one word to describe the KittiWake's performance, it would be "hot." Prior to this, the fastest plane in our club was a Sea Lion pattern float plane running an O.S. 612 with a tuned pipe. We have no equipment to measure such things, but the general consensus is that the Sea Lion does 80 and KittiWake hits 85 mph full throttle, and that's with an out-of-the box engine.

Except for absolutely calm conditions, water handling with a pylon float requires a little practice, and we suggest running out a tankful while taxiing to get aquainted. Basically, elevator control is not needed until liftoff, as the forward bulk of the float will keep the tail down and the water

(Continued on page 115)

MODEL AIRPLANE NEWS

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